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# THE PROBABLE FUTURE DISTRIBUTION OF FUTURE LAND OWNERSHIP

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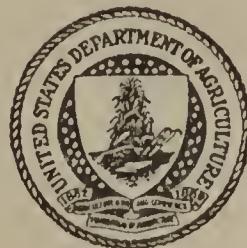
“A NATIONAL PLAN FOR AMERICAN FORESTRY”

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A Report Prepared by the Forest Service, U. S. Department of Agriculture  
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# THE PROBABLE FUTURE DISTRIBUTION OF FOREST LAND OWNERSHIP

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## STABILITY OF OWNERSHIP PREREQUISITE TO FORESTRY

Stability of ownership of forest lands is a prerequisite to the stability of forestry. The bulk of the commercial forest lands are now in private ownership, but significant changes in ownership are taking place with great rapidity, and on a Nation-wide scale. Extensive tax delinquency in the cut-over regions; failure of any considerable number of owners to take advantage of the special forest tax laws enacted by many States specifically to help the private owner remain in the forest-land business; the rapid exploitation of forests with scanty provision by the owners for continuing in the forest-growing business; and the very large areas of forest land offered at distress sale to public agencies—all are indicative of existing changes in forest-land ownership. These trends are even more significant as symptoms of widespread and imminent changes in the distribution of ownership.

Formerly forested land, now or recently used for farming, is being abandoned as unsuitable physically or economically for farming, and is thereby becoming available again for forest production. Major changes in the character of ownership of such land are obviously inevitable if it is to be managed for its highest value of forestry.

Other sections of this report bring new information to bear on the forest situation and the forest problems of the Nation. To a very high degree, these finally focus on the question of ownership—whether existing ownership is accomplishing the full conservation of forest values so clearly needed, whether it is likely to, and whether a realignment of ownership should be deliberately sought, regardless of the trend toward breakdown of private ownership, and the consequent

<sup>1</sup> The subsection Estimated Public Share of Land Ownership for Timber Production is largely the work of E. I. Kotok, Director, California Forest Experiment Station. The tabulation of census records used in estimating areas feasible for public ownership in the subsection, Limiting Factors in Establishing Public Protection Forests was worked out by W. N. Sparhawk, Senior Forest Economist.

shift toward public ownership. Other sections of this report in fact suggest or recommend increase in public ownership as a means to accomplish such purposes as watershed protection, balancing the timber budget, and conservation of recreation and wild life values.

Public acquisition programs by some of the States and by the Federal Government are already established, but with the exception of a few outstanding States such as New York, Pennsylvania, and Michigan they are going ahead slowly. These public programs with few exceptions were based on what today appears to be an underestimate of the public values of forest lands, or on an overestimate of the stability of private ownership and management, and of the degree to which private ownership conserves them.

Clearly, a fresh appraisal of the probable distribution of forest land ownership is needed, one that takes account both of what is likely to happen anyway as a result of the breakdown in private ownership, and of what should be done in the direction of public ownership to meet the known needs of the forest situation. Such an analysis, which this section of the report attempts, is beset by many difficulties. Major trends, involving hundreds of millions of acres of land, varying economic conditions, deeply planted habits of political and economic thought and tradition, and complex interrelation and conflict between public and private needs and values, are not to be resolved into formulae accurate to the last decimal point. Estimates and approximations have necessarily been used in analyzing the problem, and great accuracy in the conclusions cannot be claimed. But even rather wide approximations, and the differing results obtained from various approaches to the problem, emphasize rather than obscure the conclusion that very large shifts from private to public ownership are both inevitable and necessary.

The present distribution of forest-land ownership, summarized in table 1, focuses attention on several major questions that are necessarily involved in any appraisal of future distribution of forest-land ownership. At the start, it is necessary to consider what are the bases for private and public ownership.

TABLE 1.—*Present distribution of forest land ownership*

[In thousands of acres]

Forest region	Commercial forest area						Agricultural land available	
	Private		Public		Total forest area	Chiefly valuable for other purposes than timber		
	Woodland on farms	Industrial	All private	Federal				
New England	6,402	19,576	25,978	471	824	27,273	27,434	
Middle Atlantic	9,461	15,470	24,931	347	1,861	27,139	29,770	
Lake	14,281	34,792	49,073	2,955	3,867	6,822	60,345	
Central	32,158	31,319	63,477	581	191	772	64,249	
South	57,866	129,398	187,264	3,213	281	3,494	190,758	
							26,110	
							216,868	
							18,750	
Eastern regions							51,704	
Pacific Coast	5,099	27,938	33,037	31,811	1,837	33,648	66,685	
North Rocky Mountain	1,413	5,925	7,338	23,725	1,266	24,991	32,329	
South Rocky Mountain	43	5,098	5,141	24,924	505	25,429	30,570	
Western regions							59,030	
Grand total	126,723	269,516	396,239	88,027	10,632	98,659	494,898	
							119,660	
							614,558	
							51,704	

## THE BASIS FOR PRIVATE OWNERSHIP OF FOREST LANDS

The bulk of the commercial forest-land acreage is in private ownership. The 127 million acres on farms are held by a multitude of individuals, in the vast majority of cases, as a mere incident to the primary purpose of maintaining a farm.

The 270 million acres of private commercial forest land owned by other than farmers were for the most part acquired by lumbermen and others whose sole concern was to obtain title to virgin stumppage which could quickly be exploited and turned into cash, either by operating it themselves or by selling it to others. This was one of the traditional means of acquiring a fortune, and in the vast majority of cases, the individual had little interest in the land, except to convert virgin timber into cash. In this process, it was to be expected that forests would ultimately be converted into vast areas of denuded and poorly and partly stocked cut-over land which has accumulated at an ever increasing pace.

The existing extent and geographical distribution of forest land in private ownership is a result of the liberal land disposal laws and policies on the part of the Nation and the States and the desire of individuals to enter what appeared the very profitable business of lumbering and timber exploitation. The land was acquired for the disposal of the standing timber, with no regard for future timber crops under any form of forest management.

In the pioneer period a particular tract of timber passed into private ownership when some individual thought he saw a chance to make money out of it. Now a particular tract of cut-over land from which the exploitable timber values have been removed remains in private ownership only when some individual sees in it a chance to make money either from growing timber or from the production of some other salable crop.

Public policy was never able to force into private ownership large areas of low grade or inaccessible timberland. Public policy through liberal laws could and did make it easy to acquire timberland. Public policy can make it easier for the owner to hold his land, through various forms of public aid. But no public action can force forest lands now in private ownership to remain in that status.

A statistical tabulation of existing distribution of ownership by States, regions, or the Nation is merely a current record and has only slight evidential value in forecasting future distribution. Even the most superficial survey of trends discloses, however, the large acreage of tax-reverted or tax-delinquent land, and the large acreage of virgin stumppage and cut-over land now offered for distress sale, and proves that large numbers of owners have decided or are deciding that continued ownership is a losing game.

## THE BASIS FOR PUBLIC OWNERSHIP

As indicated by table 1, publicly owned commercial forest lands are widely distributed geographically and make up 20 percent of the total commercial forest area. The continuing land acquisition programs of the Federal Government and of many States and local governments indicate widespread belief that public ownership of at least certain forest lands is preferable or supplemental to private ownership. What is the basis for public ownership?

## LEGAL BASIS

The legal basis for forest land ownership is established in many States and for the Federal Government. As to the latter, the basic laws of 1891 and 1897 establishing the national-forest system, the Weeks law of 1911, and the Clarke-McNary law of 1924, all set up the purposes of timber conservation and production, watershed protection, and the protection of navigable or interstate streams, harbors, and Federal power or irrigation projects as justifying Federal forests. The laws establishing the national parks make forest recreation a purpose of Federal reservations.

In the States with acquisition programs, watershed protection, timber production, forest recreation, and wild-life conservation are variously recognized as justifying State ownership.

The forest land acquisition by the Federal Government is limited by the legal provision that advance legislative authorization must be granted by each State before any Federal program can begin. Under existing Federal law this power of a State to prevent Federal acquisition, or to limit the area acquired, is not restricted.

## ECONOMIC BASIS

In the West the national forests included originally those public lands which had been unattractive to private ownership. Elsewhere—and the same is true with regard to acquisition of private lands for the western national forests—all forms of public acquisition of forest lands are to be justified by the fact that the lands possess values of public importance, protection, recreation, and wild life, which can be or are depreciated or jeopardized by the practices of private ownership. Also, the private owner, being almost universally under compulsion to handle his property for profit, commonly destroys or reduces the timber-producing value of the lands, thereby injuring the public interest in a continuous and abundant supply of forest products. Other sections of this report detail the degree to which unrestricted private ownership has done this.

To protect its inherent interest in the maintenance of all values on privately owned forest lands the public may do several things:

- (1) Trust to the free play of private initiative.
- (2) Subsidize or assist the owner, in the expectation that his treatment of the forest land will improve.
- (3) Regulate the owner's use of his property, either with or without the assumption of part or all of the additional management costs thereby made necessary.
- (4) Undertake ownership of the land, thereby receiving the income from ownership as well as incurring the expense.

These alternatives are usually designated as policies of (1) "laissez-faire", (2) public aid, (3) public regulation, (4) public ownership.

The traditional attitude toward forest land was that of "laissez faire"—the classic idea of economics that since it is to the owner's advantage to keep his property productive he will automatically do so. This treatment of the forest land arose naturally from the fact that originally the major problem of the Nation, as the primary owner of the forest lands of the country, was to get a major share of these apparently inexhaustible lands into private ownership as quickly and simply as possible, as the basis for settlement of new territory and for

the rapid economic development of the country. In this process the liberal land disposal laws and the generous grants of forest lands to States, institutions, and railroads played an important part. So, too, did the traditional "cut-out-and-get-out" practice of timber mining. For the first century and more of its existence the Nation could well accept the heavy wastage of forest resources and the wholesale loss of public lands, which early became an integral part of the rush and sweep of the pioneer period and typified its spirit. Ownership of forest land carried no obligation expressed or implied.

But toward the end of the last century the need for national concern in forest lands became an urgent public issue. The last frontier was reached; the inexhaustibility myth was exploded; and the cumulative effects of land mistreatment, resource wastage, and giving away of public forest lands could no longer be overlooked by the people of the Nation and by the National Government. The first major expression of a newly aroused concern appeared in the creation of the national-forest system, designed from the beginning to retain and manage under the principles of forestry the forest lands remaining in national ownership. In addition thus to restraining somewhat the further aggravation of the Nation's forest problem it was hoped that the examples of technical forest management would stimulate similar ventures by the States and private owners on their forest properties. The venture marked the end of complete faith in the working out of the *laissez-faire* idea.

In 1911 the Nation extended its program of national-forest establishment to include the purchase of private forest lands located on headwaters of streams in the East. The need for Federal control of natural resources through ownership and management of forest lands was thus early recognized. Along with this development of the national-forest system went the development of State forests in several of the States, some antedating the national-forest system, others stimulated by the example set by the Federal Government.

The inauguration of Federal aid in fire control in 1911 was a recognition that there was a national interest in all forest lands, that private ownership needed assistance, and that the forests would remain largely in private hands. It greatly accelerated the attempt to solve the forest problem through the second method of public action—that of public aid. In line with this broader concept of public obligation most of the forest States developed public aid in fire control as an assistance to private owners. The degree of aid given from State funds varies widely, but there has been very general recognition of State interest in the treatment and condition of private forest lands.

To date the Federal Government has functioned in forest affairs in two principal directions:

First, by supplementing through public aid the State and private efforts, but leaving primary responsibility in their hands, to the degree necessary to do the job right, and where there is real intent and effort by State and private owners to do the job. Second, when other agencies were unable to unwilling to manage private forest land, by acquiring and managing it as a national enterprise. In this twofold program there is no abandonment of the Nation's traditional desire that State and private effort handle the forest problem to the greatest practicable degree. Many of the States

have followed substantially the same course—giving public aid to private owners and at the same time acquiring State forests.

But in another respect State policies have gone beyond the Federal forest policy in the attempt to solve the forest problem. In many States laws have been passed regulating the use of private forest lands in various particulars. This departure has, however, been hardly more than tentative. In no State are there complete laws designed to insure good condition of forest lands, and many existing laws are not enforced. The Federal Government had made no effort to regulate the use of private forest land. After careful study of this method, it has thus far elected to expand Federal aid instead. Public regulation has thus been applied to only a limited degree in this country, although other nations use it widely.

During this period of trying out alternative methods, opposition to public ownership has more and more centered on the idea that private ownership of forest land was essential because through taxation it supplied the revenues for local government. Private ownership is not, however, the only way in which local government may draw on forest land for current income. Two plans have been worked out to make publicly owned forest land contribute its fair share. The most widely applied of these is the national-forest plan under which 25 percent of the gross income is returned to the counties from which it was derived, in lieu of taxes.

Under the other plan, on some of the State forests, notably in Pennsylvania, a flat rate per acre per year is returned to the county.

The public ownership method has thus been adopted very widely because the other methods have been found to fail in guaranteeing permanently acceptable condition of forest lands. Public ownership of forest lands is then often a last resort device to protect public interests from damages resulting from abuse by private owners.

#### PUBLIC OWNERSHIP AS COMPLEMENTARY TO PRIVATE OWNERSHIP

Public forests have been established and managed under appropriate legal sanction by Federal, State, and local governments for the following purposes:

(1) To protect watersheds from damages resulting from mistreatment by private owners. Public ownership of protection forests of high importance is commonly recognized as a necessity where the desired condition of forest land cannot be obtained under private ownership without undue friction. This may be either because of conflict between public and real or supposed private interests, or because private owners withdraw from ownership and refuse to keep the land. The watershed section of this report details areas and regions in which critical watershed problems now exist.

(2) The provision on forest lands of recreational and related facilities open to the public has become recognized as a public function, accomplished through ownership of the land. Use of forest lands for such purposes commonly cannot be harmonized with the needs of private owners. This report (see section on "The Forest for Recreation") recommends publicly owned forest recreation areas to the extent of 45 million acres, a very considerable part of which coincides with areas of high watershed importance suggested for

public acquisition. Management of forest lands for recreational use conserves the watershed values.

(3) The public interest in continued productivity of forest lands has more and more been recognized as justifying public ownership where private owners will not keep the lands reasonably productive, and where the values produced through public management are likely to equal or exceed the costs. It is shown in detail elsewhere that for the Nation as a whole, and in many of the important forest regions, the private lands are in a very unsatisfactory condition as to growing stock. The conclusion is reached that on a very large area of forest lands, the growing stock must be built up to safeguard the timber supply of the Nation. Clearly, the accomplishment of this purpose through public acquisition and management becomes necessary and is, therefore, justified only when and to the extent that private ownership fails to accomplish it. An exact appraisal at a given moment of the extent to which, and areas and regions in which, private ownership will adequately redeem the public interest in forest productivity, is beset by many difficulties and is, indeed, virtually an impossibility.

(4) A large area of wrecked, denuded, or badly depreciated forest land, often designated as "no man's land" or "the new public domain" is a special field for public ownership. Most of such lands, are permanently submarginal for private ownership, since they no longer produce current income, and require capital investment, current expenditures, and a long wait for returns. Through the process of tax delinquency and abandonment, many are reverting to public ownership.

Other lands in this class drift from owner to owner, each of whom further depreciates the small values that may remain, and each in turn gives up the effort. This process is definitely antagonistic to the public interest and, so long as it continues, postpones any stability of ownership or systematic attempt to manage the lands constructively and restore their productivity. In most cases public ownership and management of such land is coming to be recognized as the ultimate and desirable solution.

(5) At least 50 million acres of formerly forested land, which has been used for agriculture, is no longer used for that purpose. Much of this is likely to require public ownership, if for no other reason than to remove it from the total of submarginal agricultural land, which is only occasionally used as it drifts from owner to owner. This threat to agriculture can be eliminated through controlled use for non-agricultural purposes in public ownership.

In the main, public ownership comes into the picture to protect public values and interest on classes of land or in regions where private ownership and practices have depreciated values, are depreciating, or are likely to depreciate them. Demonstration areas and scenic and recreational areas of particularly significant value are commonly acquired regardless of the intent or practices of private owners. Public ownership is not then generally competitive with private enterprise, but steps in when necessary to obtain results with a certainty not obtainable otherwise. Traditional political thought predominately holds that when private ownership applies the same practices to forest land that public ownership does, the former is in fact preferable. Public acquisition programs built on this clear-cut

principle can be scrutinized from the standpoint of what public agency can best undertake the job, and the feasibility of providing the necessary money, but not with a question as to whether the public should go in at all.

The break-down of private ownership is forcing public ownership of forest lands on a scale previously not anticipated. In the future, involuntary public ownership appears certain to be more and more widespread and extensive regardless of deliberate public acquisition programs.

## THE BASIS FOR DIVISION OF PUBLIC OWNERSHIP BETWEEN AGENCIES

### HISTORICAL BACKGROUND

Ownership of forest land by the smaller political subdivisions—towns, cities, and counties—is described in detail elsewhere. The total area now owned and managed is not large (about 1 million acres) and is to a considerable extent for park or water supply rather than forest purposes. Title to the large area of land abandoned by private ownership through tax delinquency lies in the counties in many of the States, in towns in others, or in the States directly. For the most part, counties in which land abandonment is active are little able to undertake constructive management under the principles of forestry. Depreciated forest land is generally a net expense for many years and the very process of land abandonment reduces the local government's income. Thus at the time when additional expense is required to care properly for the land, local government usually is least able to undertake new jobs.

In a few States a systematic effort is under way, sponsored by the State government, to make management of forests possible for the counties, and even the towns and cities. But in the main and with relatively few exceptions, public ownership must be either by the State or Nation.

As to the division of ownership of forest land between the States and the Federal Government, the question of what is theoretically best or most desirable in terms of our history and political thought is much confused. A strong element of political theory would leave the problem to the several States. But in most of the regions where national forests have been managed longest, public opinion supports fully this Federal venture. Federal forests, even though established to meet national needs, have come to be recognized as giving important benefits to the States in which they are located.

In law, and to a large extent in public opinion, forest lands needed for the protection of navigable or otherwise important interstate streams have come to be held as a major class of land of peculiar Federal interest. But in a few States, notably New York, the State forest programs have undertaken to acquire all of the forest lands of this character for which public ownership is needed, although the primary purpose for State acquisition may be something else. In other States, as for example Pennsylvania, both State and Federal forests contain lands of similar character and equal value for watershed protection. Even though Federal ownership of important watershed areas has become reasonably well sanctioned, individual States have

undertaken all or a large part of the public acquisition program for watershed protection.

Similarly, the general Federal responsibility to insure through land ownership the stability and permanence of the timber supply for the Nation as a whole is well established.

The Federal forest acquisition program has during the past 21 years gone ahead of several well-defined principles:

1. Where States have the desire, intent, and financial ability to undertake the full job of public forest acquisition, no national forests have been established, even though forest land problems are present that are well within the sphere of Federal land acquisition. No real need for national forests is recognized under such circumstances.

2. Where forest land problems exist, properly within the sphere of Federal land ownership, and where the State has the desire, intent, and financial ability to undertake a major part of the job, and is willing for the Federal Government to undertake part, national forests have been established. These joint programs have been carried out without conflict or competition.

3. Where problems exist, and the State is financially unable to undertake the public forest acquisition job, but is willing that the Nation do so, national forests have been established. Clearly, under such circumstances the Federal Government must take over the bulk of the public ownership job, if it is to be done at all.

4. Where problems exist, and the State lacks the willingness or financial ability to undertake the job, and for one reason or another is unwilling for the Federal Government to come in, no national forests have been established.

Whether or not a State embarks on a State forest program appears to depend primarily on financial ability rather than on political theory or desire. A number of the wealthier States have gone further and have more comprehensive programs than the less wealthy States. State forests starting with denuded or partly stocked lands, are necessarily a net expense for many years. Regardless of the need, the less wealthy States have been slow to start State forest programs.

In several of the Western States, such as Idaho and Oregon, the remaining portions of the Federal land grants to the States have been placed under administration as State forests.

In Michigan tax-delinquent lands have been consolidated into State forests.

#### DESIRABILITY OF STATE OWNERSHIP

The question of the division between State and Federal ownership of public forests has slowly crystallized as one principally of State financial ability and intent. The part falling to the Federal Government in order to protect the public interest is that part of the full job which the State is unable to do, and which it is willing to let the Federal Government undertake.

A major conclusion from experience to date is that there can be no true conflict between the State and Federal Governments in forest-land ownership when the Federal Government comes in with State sanction to handle through ownership forest lands which States are unable to manage. The very processes of forest deterioration and forest devastation are the basis alike of local impoverishment and national concern. Therefore no question of propriety or of Federal imperialism can arise, if the expansion of Federal effort in forest land

management is confined to lands where national interests are paramount or where State and private efforts are factually found to have failed or to be failing. The question of form of ownership is merely one of what action will obtain the essential result, and what agency is able to carry it out.

As to the desirability of a large increase in ownership and management of forest lands by the States, there can be no doubt. The basic question between the States and the Federal Government is not one of competition in forest-land ownership, but of whether interstate or other national interest is involved and the extent to which individual States are able financially to undertake the full task on the forest lands not properly cared for in private ownership.

The problem of whether the State or the Federal Government or both should handle the additional public forest acquisition in a particular area is thus in the main a question of determinable fact and not of abstract theory. What is important, and urgently so, is that a realistic determination of each local situation be made, as a basis for effective action.

In individual States, therefore, the best division of public-forest ownership will range from predominantly State to predominantly Federal. Sometimes it may be advantageous to have State and National forests in separate parts of the State. The sole criterion of the success or failure of the public-forest program is not who does the job, but whether the full job of management of lands which private ownership does not keep in good forest production, is done.

From the standpoint of experience to date there is little basis for arguing for or against State or Federal forests as inherently superior or inferior. There are examples of able professional management of both. Continuity of policy, freedom from politics, technical personnel, and adequacy of funds are the essentials in both Federal and State forestry.

That some of the States are still disposing of their forest lands and resources without the application of forestry principles no more proves the inherent incompetency of State forestry as a whole than does the fact that the United States is disposing of its public domain and railroad grant lands in the Northwest, now revested in the United States without proper care prove its inability to manage Federal forests.

## PROGRESS TO DATE IN PUBLIC FOREST ACQUISITION AND EXISTING PROGRAMS

In table 2 there is summarized the area previously acquired for State forest purposes, the area being acquired, and the ultimate area to be owned when present policies and plans have had full effect. The grand totals under these three captions are 4,396,000 acres, 2,232,000 acres, and 12,770,000 acres, respectively. A few of the Northern States, notably Michigan, Minnesota, New York, Pennsylvania, and Wisconsin, account for the bulk of the acreage in all categories. A considerable number of States have small or nonexistent ownership or plans for ownership. The section on "State Accomplishments and Plans" describes in detail the State forest programs.

The New England, Middle Atlantic, and Lake groups of States now own almost 90 percent of the total area of State forests, and the 3,925,000 acres of State forests makes up but 3.5 percent of the total forest area in these regions. In the South the 45,000 acres of State forests is but 0.02 of 1 percent of the forest area.

When full effect is given to existing plans in the New England, Middle Atlantic, and Lake regions, the State forests will include about 11.3 percent of the total forest area in these regions, whereas in the southern group of States they will include not over one sixteenth of 1 per cent.

TABLE 2.—*Present and prospective area of State forests*

Region	Net area	Land being acquired	Ultimate area under present policy
New England	255,838	4,027	500,000
Middle Atlantic	1,746,708	120,809	4,400,000
Lake	1,921,068	2,103,400	7,500,000
Central	98,126	3,400	250,000
South	45,006	—	120,000
Pacific Coast	125,803	—	—
North Rocky Mountain	203,000	—	—
Total	4,395,549	2,231,636	12,770,000

Less formal plans and programs, based on appraisals of what is desirable, indicate that if possible the officials of States wish to increase the eventual extent of State forests to 51,000,000 acres. This is exactly four times as much as contemplated under existing formal plans.

Table 3 summarizes the present ownership in national forests, and for the eastern States shows the additional areas in formally approved purchase units, in units known to be urgently needed but not formally established, and the total national forest area when both these plans have been carried to completion.

In the East the total area now owned is 7,218,000 acres,<sup>1</sup> of which 4,704,000 acres are primarily for watershed protection and 2,514,000 for timber production. The additional area planned in approved and tentative programs is 7,639,000 acres. The total ownership when these plans shall have been carried to completion will be 14,857,000 acres, or less than 5 percent of the total forest area of the East.

The present ownership in the West is 132,786,000 acres of which 68,375,000 acres are commercial forest land. This is about 52 percent of the total commercial forest area of the West. It is definitely planned to acquire about 11,000,000 acres within the forest boundaries and an additional 7,500,000 acres outside of present boundaries. The total national forest ownership in the West will then be 151,286,000 acres, compared to 14,857,000 acres in the East.

TABLE 3.—*Present and prospective area of national forests*

[In thousands of acres]

Region	Net area	To be acquired, definite plans	Total then owned
New England	566	564	1,130
Middle Atlantic	371	235	606
Lake	1,868	1,932	3,800
Central	730	1,230	2,010
South	3,683	3,628	7,311
Pacific Coast	42,190	—	—
North Rocky Mountain	35,507	18,500	151,286
South Rocky Mountain	155,089	—	—

<sup>1</sup> Includes Wyoming.<sup>1</sup> Exclusive of 14,000 acres in Puerto Rico.

## HOW MUCH FOREST LAND WILL PRIVATE OWNERS RETAIN AND USE IN ACCORDANCE WITH PUBLIC INTEREST?

It has already been said that the original basis for private ownership of most forest lands was the accumulated merchantable timber which could be converted into cash. The widespread breakdown of private ownership, involving many millions of acres of cut-over land, shows clearly that forest-land owners are reappraising their properties from the standpoint of their probable value for timber growing.

## FACTORS INFLUENCING PERMANENT PRIVATE OWNERSHIP OF INDUSTRIAL TIMBERLAND

Each owner, if he consciously desires to hold and manage a forest property, must weigh and appraise a number of economic factors which influence profits. His motives for holding the land may be, for example, recreation, grazing, private hunting preserves, or future speculation values, but in the majority of cases he will look to timber products as the source of revenue and will measure the profitability of ownership in terms of this commodity. Some of the more significant factors which must guide him in his decision are enumerated in the following as illustrating the complexity and variety of a forest enterprise.

### COST OF PRODUCTION

A large group of factors is involved in the marketing of forest products. Whether the markets for sawn lumber and pulp are close to the forest property, as in New England, or distant, as in the northern Rockies, is important. So is the question whether markets for bulky low-value products, such as cordwood, which are harvested during the saw timber rotation, are generally close, as in the Middle Atlantic region, or distant, as in most of the Pacific region. In the South, the production of naval stores of small bulk and high value, during the rotation, is a favorable factor which many other forest regions lack. In parts of the South, too, salable by-products are obtainable from small trees at an early age, an advantage to private forestry largely absent in the western regions.

Whether regional markets are likely to absorb the future production within the region, as in the New England, Middle Atlantic, Central, and Lake States, or whether export will be necessary, as in the Pacific region, likewise affects the outlook for private forestry. The existence of roads, so that intrarotation products can readily be reached, as in several of the eastern regions, gives an advantage not found in the West.

Established markets for certain forest products, as in New England, are a great asset. In a few regions of the East, integrated forest utilization centers, absorbing all kinds of forest products, have been established, and give owners of forest lands an assurance of markets that they lack where products must go long distances to the general competitive markets. None of these highly important marketing factors are either greatly or rapidly affected by public action.

Another group of factors is involved in the private owner's consideration of production costs. Whether growth is relatively slow, as in many of the Central region hardwood forests, or rapid, as in

the southern pine of the Pacific Douglas fir, is important. The ability of the forest to restock naturally and rapidly, if given a chance, as in the South and New England, is a very real advantage when compared to the more slow and uncertain natural restocking in the pine regions of the West. Most properties involve planting of denuded lands; cheap artificial restocking, as in the South and Lake States, is an advantage over costly planting, as in the western forest regions.

Cost of protection against fire and other agencies must be incurred annually, and mount to a major item in the cost of growing forests. The exceedingly high costs in such regions as the northern Rockies and Pacific are a marked disadvantage when compared to the lower protection costs in New England and the South. Many of the measures to obtain forest production, such as reservation of seed trees from cutting, protection of young advance forest growth, prevention of loggings fires, must be done as part of the logging operation. Regional differences in the ease and cost of these are material and affect the opportunity for private forestry.

Particularly in the Pacific region, careful selection of the high-quality trees for cutting gives the owner a chance to increase immediate returns—an opportunity less evident in many of the eastern regions. Notably in New England and the South, the forest owner can draw on resident, cheap, rural labor, which depends in part on other than forest work, usually on agriculture. Such regions have in this respect a great advantage over the Pacific region, where non-resident imported labor must be depended on largely.

Forest lands in the South often can be leased for the hunting privileges, and in the southern Rockies for grazing privileges, thereby reducing current ownership costs. In regions such as the northern Rockies, where returns from other than forest uses are impossible, the owner is obviously at a relative disadvantage. The financial ability of the State to carry a large share of the cost of protection, as in New England and the Middle Atlantic regions, is an important aid to the private owner, when compared to lack of financial ability in much of the South and in the northern Rockies.

#### AID OR HINDRANCE DUE TO PUBLIC ACTION

The foregoing costs-of-production factors are not greatly nor rapidly affected by public action, but other factors of this nature are so affected. For example, where trespass laws give real protection to the forest owner, as in the Pacific region, he is more favorably situated than where he lacks adequate protection, as in the South. Where local taxation is high in relation to the real income-producing value of the forest property, the recurring costs necessarily are an unfavorable factor. In the States of the New England and Middle Atlantic regions, where the non-Federal share of fire-control costs are paid by the State from general funds, the forest owner is better off than in the northern Rockies and Pacific regions, where he is assessed with most or all of the non-Federal share. States with regulatory laws regarding slash disposal, reservation of seed trees, etc., so far quite generally leave the private owner to assume the extra costs to the degree the laws are enforced. The probability that costs made necessary through regulation will be assumed by the State is a factor to be considered by the owner.

A very important consideration is the usual character of fires in the region, whether highly destructive, as in the northern Rockies and Pacific regions, or only partly destructive, as in the South. The conflagration hazard is high in such regions as the Lake and northern Rockies, even under organized protection, and low in the South and New England, and the regional differences bear importantly on the private opportunity. Forest properties under the threat of destructive diseases such as the blister rust, and insects such as the gypsy moth and western pine beetles, are naturally less attractive than the southern forests where such threats are absent.

Besides these factors of inherent risk to the crop, the owner must consider others which depend on public action. Whether public opinion toward fire control is strongly favorable, as in New England and elsewhere, or apathetic or hostile as in much of the South, carries a good deal of weight. The existence or nonexistence of a State fire-control organization, and whether it is strong or weak, greatly affects the likelihood that the growing forest will be protected.

#### LOCAL OPPORTUNITIES FOR PRIVATE FORESTRY

Yet another group of factors revolve around the existing opportunity for private forestry. Part of them are not greatly nor rapidly affected by public action. For example, where a high percentage of private forest land is seriously depreciated, as in the Lake States, the cost of restoring productivity and rebuilding a growing stock, makes the private opportunity less attractive than in the New England and Pacific regions, where the proportion of depreciated land is lower. Likewise, where a relatively high proportion of the productive forest land has saw timber, as in the West, the opportunity is better than where a very high proportion has only cordwood, as in the South.

Regions with an excessively high installed mill capacity usually have very active competition for stumpage, and make it difficult for individual owners to block out their holdings. Lack of this competition as in some parts of the West, gives a better chance for private forestry. So, too, where there are large areas of public stumpage managed to obtain sustained-yield operations, which serve as a balance wheel for private stumpage, as in the western regions, the private owner has a far better opportunity than where all or nearly all the stumpage is in private hands.

Where the key species in the forest are general utility woods, such as southern pine and Douglas fir, the wider markets available are a real advantage over those accessible to specialty woods, such as some of the soft pines.

In the western regions to date most logging operations have involved very high capital investments in mills, logging equipment, and transportation systems. Where such high investment operations are necessary, the private owner is at a disadvantage compared with owners in some of the eastern regions where less elaborate and costly operations fit the smaller timber and easier topography.

#### REGIONAL TRENDS

Aside from all of the above factors bearing on marketing, cost of production, risk to the crop, and existing opportunity, the owner is likely to be influenced by current regional trends. A strong tendency

to land abandonment by other forest owners, as in the Lake States and parts of the Pacific region, is indicative of the judgment of land-owners that forest-growing opportunities are poor. General lack of land abandonment, as in New England, on the contrary, expresses general belief by landowners that a fair opportunity exists.

Then, too, the social tradition to hold land as the primary source of wealth is a powerful factor in New England, whereas the more typical attitude of western owners is to regard land as simply a medium for the immediate exploitation of the wealth it produces.

Of these factors, and there are many others, some may assume major importance in one broad type and region and may be inconsequential in another region. Furthermore, what may be a true answer as to a specific factor for a region as a whole, may not be correct for a given forest property in that region.

#### BALANCING LOCAL ADVANTAGES AND DISADVANTAGES

The exact value and relative weight of each factor are not readily ascertainable and even if these could be determined, the relative opportunity for private forestry in each region could not be stated with mathematical exactness. Recognizing these inherent difficulties, an approximation of the relative opportunities for private forestry has nevertheless been attempted by weighing these factors for each major type and region. Each major forest region contains two or more forest types, and only rarely do all the types in a region bear the same rating as to private opportunity. For example, in the Southern region, the pine type of the coastal plain rates very high, whereas the oak-chestnut-yellow poplar type of the Appalachians in the same region rates relatively low and the oak-pine type of the Piedmont Plateau is intermediate. Similarly in the Pacific region the Douglas fir type of the northwest rates as superior in private opportunity to the ponderosa pine type of the same region. Simply as a matter of convenience in tying the private opportunity ratings to the classification of forest regions which is used throughout this report, an average rating for each region has been estimated, weighed to recognize differences in area of types within regions.

By this means the several regions may be divided into four broad classes of opportunity for private forestry, as follows:

- Class 1. Most favorable: New England, Middle Atlantic, Central.
- Class 2. Generally favorable: South.
- Class 3. Only locally favorable: Lake, Pacific.
- Class 4. Least favorable: North Rockies, South Rockies.

This does not, of course, mean that all properties are a favorable chance in the regions at the top of the list, nor all at the bottom an unfavorable chance. Only a detailed rating of each property can determine its individual opportunity. Any attempt to carry the interpretation of the rating beyond its significance as a broad average would be wholly unwarranted. It is a relative, not an absolute rating. Neither should it be interpreted by any private owner, regardless of the region in which located, as evidence that he cannot profitably practice forestry. The Pacific region has been placed in the third class, but yet its fine stands of remaining virgin timber, the rapid growth of species, and the high quality of the product combine to present locally some of the most favorable opportunities for private forestry.

The trend of forest-land abandonment by private owners in all regions may similarly be rated on a relative scale and classified by regions, as follows:

Class 1. Little abandonment: New England, Southern Rockies, Middle Atlantic.

Class 2. Some abandonment: Central, South.

Class 3. Considerable abandonment: Lake, Pacific, North Rockies.

Roughly, the highest rates of land abandonment coincide with the lack or local limitation of favorable opportunity for private forestry, and the lowest rates with most favorable opportunity. The small amount of abandonment in the South is due in part to the State laws dealing with tax delinquency and to more or less lax administration of them. The southern Rockies although classed as least favorable to private ownership, shows little land abandonment. This is due to the fact that in this region lands can be leased for grazing.

In all probability most, if not at all, owners who have abandoned land have simply considered the likelihood of any profit in holding their property in a very general way. It is unlikely that many have made a detailed factual analysis of their chances. But the mass effectiveness of the numerous adverse forces, focusing finally in some regions into a predominant push toward land relinquishment, can hardly be doubted. The rates at which forest lands are abandoned through tax delinquency express a gradual decision by scores of individual owners to give up a struggle which more and more appears to be a losing one, and which has been accentuated to some degree by the depression. It is to be suspected, however, that a detailed analysis would indicate basic reasons for the regional distribution of forest land abandonment.

It can only be concluded that a trend in the direction of land relinquishment by private owners of forest land, which is based on so large a number of inherent factors, may acquire even further momentum.

#### EFFECT OF PRESENT PUBLIC SUBSIDIES

Public aid in varying degrees has been given to forest owners in protection against fire, insects, disease, and in deferred or lowered taxes on immature, growing forests. These forms of aid and what they have accomplished are discussed in other sections of the report. Both kinds and amounts of public aid have varied widely from State to State, and they are considered here merely as they have influenced retention of forest lands in private ownership. For example, public aid in fire control has been given in many States, yet this has not in itself, so far, materially influenced retention of private ownership of forest lands. In table 4 present expenditures for fire control and the amount contributed through public aid are shown.

A comparison of different regions indicates, for example, that in both the New England and the Lake States regions almost the entire cost, and in nearly equal amounts, is now assumed by the public. But in the former, there is very little land abandonment; in the latter a great deal.

The conclusion is warranted that public aid in fire control is not a substantial factor in keeping lands in private ownership, even where the total cost is paid by the public. It is, however, a good public

investment insofar as it keeps lands more productive than they would otherwise be.

The total expenditures from all sources for protecting private forest lands against fire averaged \$5,400,000 for 1926-30 and was \$7,221,000 in 1931. Of the latter amount about 80 percent was paid by the public, and 20 percent by the landowner. The estimated needs total \$19,828,000, of which public agencies would pay \$14,871,000 a year, if the same proportionate division is maintained. It seems at least possible that, as the States and the Nation increase their appropriations and approach this estimated total of needed public aid to private landowners, the public may be much more inclined to assume the additional costs of full ownership and realize the concomitant powers and benefits.

TABLE 4.—*Present and needed annual expenditures for fire control on State and private lands*

[Amounts in cents per acre]

Region	Present expenditures <sup>1</sup>	Paid by public <sup>1</sup>	Estimated costs required	Region	Present expenditures <sup>1</sup>	Paid by public <sup>1</sup>	Estimated costs required
New England	1.94	1.92	2.86	Pacific Coast	3.28	1.60	6.43
Middle Atlantic	2.77	2.77	3.35	North Rocky Mountain	5.90	1.65	8.39
Lake	2.01	2.00	4.24	South Rocky Mountain	2.89	—	1.39
Central	.40	.40	2.55				
South	.43	.34	5.43				

<sup>1</sup> Average 1926-30.

<sup>2</sup> Incomplete records of expenditures on private land in New Mexico.

Tax-relief laws on forest lands, cut-over stands, or growing forests exist in about 30 States yet few owners have taken advantage of them. About one and one half million acres is listed out of the total forest area in private ownership, the average being below 0.5 percent of the total area. The maximum is reached in Oregon at 3.1 percent. The preferential tax, a form of public aid, has not so far influenced retention of forest lands in private ownership, or modified materially poor treatment of forest lands. Apparently, judging from present actions by owners, the preferential tax holds little interest for them.

A very generalized tabulation of costs for a timber property will show 5 to 10 cents per acre per year for fire control, 15 to 25 cents for timber management, and 20 to 50 cents for taxes. The public may go so far as to assume the costs of the first item, but unless the forms and amount of public aid are greatly expanded the owner will have to meet the others.

In the main, the conclusion is warranted that public aid so far has been only a minor factor in keeping forest lands in private ownership. Other conditions not affected by public action have been far more controlling.

In the analysis of factors affecting permanence of ownership of private forest lands, some not greatly nor rapidly affected by public action, and others that were so affected were listed. If there were nothing to forestry but fire control then public aid would have high potentialities for keeping lands in private ownership and management. But since other expenditures are necessarily involved—and such as are unlikely to be assumed by the public—public aid can hardly be regarded as a general formula to keep forest lands in private ownership.

Where cash returns must be deferred for years, it seems unlikely that the owners will regard private forest properties as favorable investments. It also seems unlikely that public aid will assume all costs of ownership, leaving title to the land and future income to the private owner.

The limitation of Federal aid in fire control is indicated by the fact that over 191 million out of nearly 420 million acres of State and private forest land are still without organized fire control. At the recent rate of progress it will require 22 years to get organized fire control extended to all forest lands needing it. Whatever the reasons for this lack of progress, it has to be recognized that public aid has sharp limitations.

#### PROBABLE ACREAGE OF INDUSTRIAL TIMBERLAND RETAINED IN PRIVATE OWNERSHIP

##### REGIONAL DISTRIBUTION

On a previous page the opportunities for private forestry by regions have been roughly classified by means of the examination of the factors which ordinarily affect profits in timber growing and manufacture. The analysis indicated several of the major regions in which the private forest landowner generally has a relatively good chance. But it does not follow, even in such a region as New England, which was rated very high, that all forest land now in private ownership will remain there. Public interest may justify and dictate ultimately a policy of considerable area in public forests. Several of the States in this region have acquisition programs for State forests and State parks, and some of the forest land will probably come into public ownership because of high watershed and recreation value. Where land abandonment occurs in New England, further extension of public forests may be expected. Other forms of public ownership, such as town forests, are already in existence and seem destined to expand.

On the other hand, in the regions with the least favorable chance for permanent private forestry, it is very unlikely that all lands will pass to public ownership. Some forest properties will be far superior to the regional averages for permanent private enterprises and some lands will possess peculiar values for income-producing recreational use that will make them acceptable private investments for such purposes as country estates and game preserves. Thus, even in the least favorable regions some of the private land may be expected to remain in that status.

In regions shown in opportunity classes 2 and 3, that is generally favorable and locally favorable, a larger proportion of the area is likely to stay in private hands than in the least favorable regions, and a smaller proportion than in the most favorable regions. In 1931 a group of State forest officials of the New England States studied the question of the ultimate extent of public ownership of forest land in that region. Their conclusion was that 15 percent of the total forest area would be acquired by the public, in addition to that now owned. This determination has been accepted as a measure of the probable extent of additional public ownership in regions where the most favorable opportunity for private forestry exists. In the North Rocky Moun-

tain region an analysis of the probable plans of the owners of the larger tracts of private forest land indicated that not over 10 percent of the forest land was likely to remain permanently in private ownership. In the regions least favorable for private forestry, this figure has been used. It has then been assumed that in the intermediate classes (2 and 3) 60 and 35 percent, respectively, will remain in private ownership. On these broad assumptions an approximation of probable future private ownership of forest land, exclusive of farm woodlands is attempted. In table 5 are presented the acreages now in private ownership, the opportunity classification for private forestry, and the percentage and area likely to remain in private ownership. The indication is that, for the United States as a whole, more than 40 percent of present private holdings will go into public ownership, involving an acquisition program of some 115 million acres. Of this total 73 percent will come out of the eastern regions, but will represent only 36 percent of the present private forest land area in the East. The 27 percent from the western regions, on the contrary, represents 81 percent of private holdings.

TABLE 5.—*Possible future distribution of ownership of commercial forest land now privately owned, exclusive of farm woodlands*

Region	Present commer- cial pri- vate land	Oppor- tunity class	Commercial forest land to remain in private owner- ship		Total public acquisi- tion
			Million acres	Percent	
New England	19.6	1	85.0	16.7	2.9
Middle Atlantic	15.5	1	85.0	13.2	2.3
Lake	34.8	3	47.5	16.5	18.3
Central	31.3	1	72.5	22.7	8.6
South	129.4	2	60.0	77.6	51.8
Pacific Coast	27.9	3	22.5	6.3	21.6
North Rocky Mountain	5.9	4	10.0	.6	5.3
South Rocky Mountain	5.1	4	10.0	.5	4.6
Total	269.5		57.2	154.1	115.4

Although this estimate can be regarded only as having an indicative value, it does signify that unless several miracles occur shortly, the problem of public ownership of forest lands will have to be recognized and attacked on a very much more comprehensive scale than has been previously envisioned.

#### DISTRIBUTION BY GROWTH CLASSES OF INDUSTRIAL TIMBERLAND

The problem of future ownership distribution can be approached by another method, namely, the present condition of the land. The private forest land owned by other than farmers is thus classified in table 6. Here the areas that may remain in private ownership are estimated on the basis of realizable and more immediate prospective value. Thus it is assumed that private ownership would retain the bulk of the 91 million acres still possessing realizable timber values, and in the main offering a business opportunity to private ownership to practice private forestry. In addition it may retain about two thirds of the cordwood area, about one third of the fair to satisfactory restocking area, and only a small fraction of the 54

million acres now so devoid of forest values, owing to destructive logging and fires, that before it can again produce a forest income it must be planted with trees and protected against fire and other destructive agencies for 25 to 100 years.

Even with liberal public assistance in planting and protection, the cash expenditures needed to restore realizable crops on the "poor to nonrestocking" areas, and the period of waiting for a cash income, make the bulk of such lands exceedingly unattractive for private ownership. Public ownership of one kind or another appears inevitable for a very large part of this acreage. Whether it is purchased, or whether the public agencies wait to acquire the land through the slow process of tax-delinquency, the eventual outcome is likely to be the same. It will come into public ownership because nonproducing forest land is a liability to private owners and neither eventual possibilities nor immediate public assistance are likely to offset this stubborn economic fact.

TABLE 6.—*Possible future distribution of ownership on the basis of present condition of private land (other than farm woodland)*

Condition of land	Total present area of private land		Area remaining private
	Million acres	Million acres	
Total saw timber...	91	91	100
Total cordwood...	62	40	65
Total fair to satisfactory restocking...	63	20	32
Poor to nonrestocking...	54	5	9
Total acreage...	270	155	-----

About 125 million acres of the privately owned forest land other than farm woodland has been cut over but has a partial reserve of unmerchantable trees and young growth or trees of cordwood size. The stocking varies greatly, and the attractiveness of this class of forest land as a permanent private ownership opportunity varies just as widely. On millions of acres of pine land in the South, for example, cash returns can be obtained when even a partial forest stand is both young and small. Naval stores, posts, poles, and pulpwood can be sold readily, and most of the land is readily accessible so that scattered trees and products can be harvested.

In much of New England likewise an income can be obtained from the young, partially stocked forests through sale of cordwood, posts, poles, and other special products of small trees. Under such circumstances, and where markets are close at hand, many of the partly stocked forest lands offer a possible or even an attractive return to the private owner. In most of the West, on the contrary, partially restocked forest land offers little opportunity for current returns through sale of forest products obtainable from small trees. Until the trees reach saw-timber size, the owner must pay carrying and protection costs without in the main realizing any current income. Transportation charges make it uneconomic to harvest such products as cordwood and posts.

In the Lake States the rapid progress of land abandonment by private owners indicates clearly that unstocked and partly stocked forest lands are generally unattractive for permanent private ownership.

Possibly some two thirds of the 63 million acres fair to satisfactory restocking area and one third of the cordwood area may pass finally to public ownership. On this basis the analysis indicates about 115 million acres of the 270 million total as the eventual area in public ownership.

#### ADEQUACY OF ESTIMATES

These estimates may be materially wide of the mark; the true answer cannot be determined for many years. But it is essential to recognize that a powerful and large-scale trend away from private ownership and into public ownership is already under way and that it is a natural phenomenon, arising from fundamental conditions. It is distinctly not an artificial trend, induced by political theory or by any efforts of public forestry agencies to displace or drive out private ownership.

This conclusion is inevitable as the sharp differences between the several States and regions are examined. Where forest lands are in small ownership, close to markets, where the products of young and small trees are readily salable, and thus where the owner of forest land can obtain current income at least sufficient to offset current expense, there land abandonment and distress sales of cut-over lands to public agencies are not major problems. On the contrary, where forests and markets are far apart, where only the products of large trees are salable, and where consequently the owner cannot offset his current expenses through current income, there the private owners are getting rid of cut-over lands or intend to do so. The question, then, is not whether it is desirable that forest land remain in private ownership to the degree that now obtains, or to some other specified degree. With or without public policy or financial aid, or any other conscious and deliberate action, individual private owners are deciding their own course of action.

It is manifest that past and current abuse of forest land by the owners has enormously reduced the acreage on which even a gambling chance of economically successful private forestry remains. These destructive practices—heedless logging methods, wholesale burning of slash, clear cutting, and inadequate fire control—have been recognized for years by forest landowners, conservationists, and foresters. The remedies recommended and applied so far have consisted principally of public aid in fire control and, in some places, local regulation laws requiring fire control and leaving of seed trees. Some private owners in every forest region have on their own initiative applied forestry practices to their properties, but only a very small fraction of the total private forest land has thus been handled. The accumulated 55 million acres of unproductive cut-over forest land taken alone is in large part the answer to the question whether major changes in land ownership are desirable.

If public aid consistent with national policy could keep lands now cut over or to be cut over in private ownership, under forestry management, and producing forest crops, no problem would exist. But the conclusion is inescapable that as to a very large area, the

private owner will decline to continue to do much even with present public aid. Whether the estimated 115 million acres of present private areas that private ownership will wish to relinquish remains untended and unmanaged as "the new public domain" under involuntary ownership by towns, counties, or States, or is held and managed as public forest property, it will be public land, and a public problem.

#### THE PROBABLE FUTURE OWNERSHIP OF ABANDONED FARM LAND

The area of farm land abandoned for agricultural use (see section "Agricultural Land Available for Forestry") now totals 51,717,000 acres east of the Plains and, it is estimated, will be increased by perhaps 25 million acres within the next 20 years. Possibly as much as one third is on occupied farms. The bulk of this will remain in private ownership, so long as the farms are occupied. Such land generally constitutes an integral part of the farms and is favorably situated for private forestry use. Although most of it will have to be planted to produce a timber crop within a reasonably short period, this will require very little cash expenditure. Most of the States furnish forest planting stock at low or nominal prices for planting on farms, and the farmer can do the planting himself. Many farmers have planted waste land during the last few years, and the extent of such work is steadily increasing.

Private owners are less likely to reforest the idle land on abandoned farms. In most cases they hope to sell it, usually to some one who will attempt to farm it. In many cases the reason for abandonment is erosion induced by bad agricultural practices. Washing away of the topsoil and gullying are common causes of abandonment.

Most of such land is submarginal for agriculture. Attempts to farm it will usually result in loss to the individuals and additional social and economic burdens on the communities. In hilly country, serious erosion and consequent damage to public and private interests may result. As long as such land is held in unstable ownership it will constitute a threat to the community welfare, not only locally but within a wide territory. The only way to insure stable ownership and use will be for the public to acquire the land and manage it under a definite program. In public ownership, the use of the land can be controlled. It will be possible both to prevent uneconomic use contrary to the best interests of the individuals and to society and to bring about a productive use that will benefit society.

Much of this land will gradually drift into public ownership by way of tax delinquency, as indicated by the trends in States and regions where agricultural land abandonment is most active. The processes of erosion have become so pronounced that on much of the abandoned area it is too late to remedy the condition through prompt adoption of such agricultural practices as terracing and contour plowing.

In some regions it is already possible to block up considerable areas of land that have thus reverted to public ownership, including both forested and idle land. In general, however, public acquisition by this method cannot proceed systematically and the process entails great economic distress to individuals and communities. Systematic and fairly rapid acquisition by purchase, if necessary, would be desirable. In this way bad practices can be halted more promptly and restora-

tive practices, such as fire protection, planting, and conservative grazing, can be begun.

Extensive land abandonment is an index of local poverty, and tends to aggravate it. Towns and counties with large areas of idle land are likely to be financially weak and to require heavy subsidies from the States for the support of roads, schools, and other public functions. They cannot, therefore, be expected to invest much cash either in acquiring forest land or in rehabilitating and managing it even where it is acquired at little or no cost. Outside capital will be required. This will have to be supplied by the States or the Federal Government.

Where the area of idle land plus land already in forest constitutes a relatively large proportion of the total land area, and where agricultural use of the remaining land is generally submarginal and tending to decline, or is injuring the public welfare through erosion, silting, and disturbance of stream flow, public forestry is indicated.

Probably at least half of the 50-odd million acres of idle land that is now available for forestry, and much of the land that may be abandoned for agriculture in the future, will eventually find its way into public forests. It is safest to assume that about 50 million acres previously classed as farm land will come into public ownership in one way or another. The regional distribution of this class of land is shown in table 1.

#### THE PROBABLE FUTURE OWNERSHIP OF WOODLAND ON FARMS

In addition to the 52 million acres of abandoned farm land now available for forestry, and the possible 25 million acres to be available subsequently, about 127 million acres of commercial forest land is owned by farmers in the form of woodlands. Its regional distribution is shown in table 1. Some part of this 127 million acres is attached to the 52 million acres of abandoned agricultural lands. Without extensive field surveys there is no way even to approximate the woodland area so involved. It is probably not less than 25 million and may be 50 million acres.

The fact that most farm woodland is readily accessible to transportation facilities—and that a large part of it is above the average in potential productivity for timber—favors continued private ownership and management. Woodlands on many farms are closely linked with the farm economy. The farmer depends on them for firewood, posts, and other farm timber. They shelter his fields and buildings and livestock against excessive winds and extremes of heat and cold. They give variety to the scenery and contribute in many ways to the pleasantness of his environment. In numerous instances they also supply a cash crop which he can harvest and market when other crops fail, or at times when other farm work is slack. They require very little investment except the farmer's own time, and the carrying charges are commonly very small. In many cases, the farm woodland constitutes a sort of land reserve, upon which the owner can draw when he wishes to increase his acreage of crops or pasture.

It is likely, then, that a large proportion of the woodland on permanently established farms will remain in private ownership. Its area will fluctuate more or less, as some forest is cleared and as other land reverts to woods. For the most part, the owners will have sufficient interest and opportunity to keep it reasonably productive.

The public can best fulfill its responsibilities by showing the owners how they can improve their practices by assistance in marketing forest products and by help in combating pests, diseases, and fires. The fire risk, incidentally, generally will be much less than in the case of the larger industrial forest tracts. It would not be practical for the public to acquire any considerable area of woodland on established farms, and there is little occasion to attempt it.

In localities where a large proportion of the land is submarginal for farming, and where many of the existing farms are consequently on an unstable basis, the situation may be quite different. There a large part of the land in farms is woodland (in naturally forested regions) and the degree of farm abandonment is likely to be high. In many instances the woodland is fairly well stripped of readily realizable values before it is abandoned, so that there is little incentive for other individuals to acquire it. In numerous localities of this sort the maintenance of a forest cover is important for protection of soil and watersheds. The existence of widely scattered farms may entail heavy expense for roads and schools that could be eliminated by public acquisition of the land. In some localities there is both opportunity and justification for public acquisition of considerable areas of farm woodland, along with the unwooded land that should be taken out of agricultural use. Much of this kind of land is coming into public ownership through tax delinquency. It may be desirable to speed the process up and bring it about in a more orderly manner—and one less cruel to the landowners—by deliberate purchase.

An estimate of the probable future distribution of ownership for woodlands on farms can only be an approximation. It is evident that large areas of commercial forest land in all regions will eventually come under public ownership and management. Definite public forest units will naturally be blocked out, as they are now in the purchasing of forest lands for State and Federal forest purposes. Within these units, certainly abandoned agricultural lands and the woodlands attached to them will come within the price range of public purchase. It is reasonable to assume that other farm woodlands within the units, attached to operating farms, will to a large extent be on the market, also. Tenant farming of hill farms—those within the future public forest purchase units—is exceedingly common. The farm as a whole is of interest to the owner only as a source of immediate revenue, which comes mainly from the acreage actually farmed. It is to be expected that once the woodland is of interest to a possible purchaser, it will be on the market. In many of the forest regions, the woodland on farms is not an integral part of the farm itself, and the operation of the farm land does not depend on the ownership of the woodland. None of these general statements is universally applicable.

One basis for estimating the eventual public acquisition of farm woodlands is to assume that the public will get the same proportion as it is estimated to get of other private woodlands. In a very broad way this means that within public forest units, the public will acquire about the same proportion of both classes of private forest land (table 7).

On this basis the total area of private land which may eventually come into public ownership for forest purposes is 115 million acres from commercial forest owned by other than farmers, 50 million

acres of abandoned agricultural land, and 47 million acres of woodland on farms, a total of 212 million acres.

The method of estimating used goes at the problem from the angle of what lands the public will need to take care of because they are no longer attractive to private ownership. But clearly, the magnitude of the public acquisition job should also be estimated from the direction of what is needed to insure realization of the public purposes of timber supply, watershed protection, recreation, and wild life. Estimates of public ownership for these purposes are made in the following pages.

TABLE 7.—*Possible future distribution of ownership of commercial woodland on farms*

Region	Present area woodland on farms	Percent-age to public ownership <sup>1</sup>	Area woodland to public
New England	6,402,000	15	960,000
Middle Atlantic	9,461,000	15	1,419,000
Lake	14,281,000	52.5	7,498,000
Central	32,158,000	27.5	8,843,000
South	57,866,000	40	23,146,000
Total, East	120,168,000	34.8	41,866,000
Pacific Coast	5,099,000	77.5	3,952,000
North Rocky Mountain	1,413,000	90	1,272,000
South Rocky Mountain	43,000	90	39,000
Total, West	6,555,000	80.3	5,263,000
Grand total	126,723,000	37.2	47,129,000

<sup>1</sup> Assuming percentage of farm woodlands to public ownership will equal percentage of private industrial forest to public ownership. (See table 5.)

## PUBLIC OWNERSHIP AND TIMBER PRODUCTION

### PRESERVATION OF GROWING STOCK A VITAL CONSIDERATION

Because of their relation to the question of ultimate ownership of forest lands, it may be well to review here a few of the more pertinent findings in the detailed discussion of growing stock given in an earlier factual section, "Present and Potential Timber Resources." Among these is the certainty that forest land with balanced distribution of saw timber, second growth, cordwood, and smaller age classes can be made to contribute indefinitely and in a very large way to the Nation's economic welfare. So far in our national history, we have merely been harvesting the stored up old growth of centuries past, and as this has disappeared we have proceeded with the next process, cutting heavily and repeatedly into the usually inferior volunteer second growth and cordwood stands. Excepting where the most destructive forces have been permitted to sweep a forest, some kind of forest growth has followed, even where unregulated cutting or promiscuous, uncontrolled fires have taken place, but with serious impairment of forest values. This process cannot continue indefinitely without depleting the forest capital—the growing stock that is the sole base on which saw timber can be produced—and without depreciating the forest soil that influences the growth rate of the timber crops. The

facts that a great deal of our land is suitable for timber production, that large areas in the West still have considerable stands of untouched virgin stumppage, and that some kind of a forest has often followed even where cutting has been heavy, have masked the critical situation of a continually mounting deficit in our forest growing stock. Thus we have the anomaly of great stretches of potentially highly productive forest lands but a dearth of growing stock both in total amount and in regional distribution.

In the past few years a further factor has operated to create a false confidence in the inexhaustibility of our timber supply. Large blocks of virgin stumppage in the Pacific Northwest have been liquidated under apparently uncontrollable economic pressure, which has, much too rapidly, forced timber into an already glutted market. At the same time, second-growth timber in the South, manufactured into lumber at low costs, entered the same competitive market, further depressed prices, created discouragement in the timber holder and lumber manufacturers on the one hand, and gave the public the false hope of unlimited timber supplies. Only where cutting out of a forest has been followed by the inevitable complete breakdown of the dependent industrial life, has there been a full appreciation that forest wealth can be dissipated. Even where this has taken place over a wide region, the local effects only have been recognized, and the national aspects and interests have been largely ignored.

World-wide economic changes have directed public attention to the need for national planning. How lands and resources are handled, obviously, must be carefully considered in any major national planning scheme. Present and potential forest lands make up between one fourth and one third of our total land area which is capable of producing abundant timber crops if some rational, Nation-wide plan of management were applied. If we are to enjoy the sustained and cheap abundant supplies of raw materials that forests can produce, we must plan for it in a systematic way.

#### PRESENT CONDITION OF GROWING STOCK

The data now available, at best approximate, indicate that a Nation-wide plan is needed to insure a continuous supply of timber of at least 17 to 18 billion cubic feet annually, which is about the amount now used in the United States. Our present growing stock is deficient in two respects to accomplish this purpose; it is below the total needed, and its distribution between important forest regions is badly out of adjustment.

The regional ratios of present timber stand to actual growing stock required to maintain a growth of 17.7 billion cubic feet annually are as follows:

	<i>Decimal ratio</i>
New England-----	0. 9
Middle Atlantic-----	. 6
Lake-----	. 3
Central-----	. 4
South-----	. 4
Pacific-----	1. 9
North Rocky Mountain-----	1. 6
South Rocky Mountain-----	2. 7
All regions (weighted)-----	. 8

The important southern region, still a factor in timber production, has only four tenths of the growing stock needed, and cannot continue to furnish its quota of timber for the national needs under the proposed budget on the present basis of management and intensity of cutting. Even in the western regions, unless care is exercised, the apparent surplus in growing stock can be dissipated unless plans for careful forest management are initiated at an early date and positive corrective measures taken. But under any plan there will be a shortage of saw timber before an annual growth of 17.7 billion cubic feet is attained unless existing information is later found to be in error. The western surplus of mature timber, if well husbanded, can partially bridge this gap.

#### AREAS NEEDED TO SUPPLY NATIONAL TIMBER REQUIREMENTS

A plan providing conservatively for our national timber needs, outlined in the factual section already cited, sets up both the land area of 508.6 acres to be used and the intensity of management, with which to build up the growing stock and assure an annual production equal to estimated normal requirements. In table 8 the data are summarized.

TABLE 8.—*Possible regional allocation, by types of management, of area available for timber use*

[Areas given in millions of acres]

Region	Total area <sup>1</sup>	Area for intensive forestry	Area for extensive forestry	Area for simple protection		
				Forested land, relatively—		Not likely to re-stock <sup>2</sup>
				Favorable	Unfavorable	
New England	23.1	5.0	12.0	1.8	0.7	3.6
Middle Atlantic	30.1	6.0	14.0	2.1	—	8.0
Eastern regions	53.2	11.0	26.0	3.9	0.7	11.6
Lake	60.7	11.0	30.2	5.0	5.0	9.5
Central	75.6	10.0	41.8	5.9	8.6	9.3
South	205.9	30.0	131.5	14.8	17.8	11.8
Middle and southern regions	342.2	51.0	203.5	25.7	31.4	30.6
Pacific Coast	57.4	7.0	33.0	4.8	8.8	3.8
North Rocky Mountain	26.8	.5	10.0	4.1	10.4	1.8
South Rocky Mountain	29.0	.5	6.4	2.2	18.4	1.5
Western regions	113.2	8.0	49.4	11.1	37.6	7.1
All regions	508.6	70.0	278.9	40.7	69.7	49.3

<sup>1</sup> Includes the 494.9 million acres of present commercial forest area and the 54.7 million acres of farm land now available for forestry, with reductions of 2 million acres of forest land to be cleared for agriculture in the West and of 39 million acres for recreation and other purposes.

<sup>2</sup> Residual area of denuded commercial forest land and agricultural land available for timber use, after allowing natural restocking of 42.9 million acres and planting of 25.5 million acres.

#### PROBABLE FUTURE DIVISION OF RESPONSIBILITY BETWEEN PUBLIC AND PRIVATE OWNERSHIP

The acreage required in the budget is made up of commercial forests in private ownership, the farm woodlots, and abandoned agricultural lands available for forestry. It also includes forest lands now in public ownership on most of which some form of forest manage-

ment is already under way. The plan, however, requires considerable intensification of management even on the publicly owned lands. It is assumed that the degree of management required in the plan will be applied to the present publicly owned lands susceptible of and available for such treatment. If these areas are deducted from the total areas set up in the budget, the remainder represents the areas for which further provision of management must be made. In Table 9 these data are given for the several forest regions.

If the 84.6 million acres now in public ownership are handled according to the plan, there still remains 374.7 million acres which likewise require specific forms of management. This means that in addition to what can be accomplished on lands now publicly owned, intensive forestry must be practiced on 62.3 million acres, extensive forestry on 243.3 million acres, and in addition adequate fire protection on another 69.2 million acres. The question must be asked: How far can dependence be placed on private capital and ownership to initiate and carry out a substantial part of such a plan?

TABLE 9.—*Total area needing different kinds of management, after deducting present public forests, by regions*

[Value given in millions of acres]

Explanation	New England	Middle-Atlantic	Lake	Central	South	Pacific Coast	North Rocky Mountain	South Rocky Mountain	Total
Total area needed for intensive forestry-----	5.0	6.0	11.0	10.0	30.0	7.0	0.5	0.5	70.0
Area available in present public forests-----	.5	1.0	2.0	.4	1.0	2.0	.3	.5	7.7
Additional area required-----	4.5	5.0	9.0	9.6	29.0	5.0	.2	0	62.3
Total area needed for extensive forestry-----	12.0	14.0	30.2	41.8	131.5	33.0	10.0	6.4	278.9
Area available in present public forests-----	.8	.5	2.0	.3	2.0	15.0	8.7	6.4	35.7
Additional area required-----	11.2	13.5	28.2	41.5	129.5	18.0	1.3	0	243.2
Total area favorable, requiring simple protection-----	1.8	2.1	5.0	5.9	14.8	4.8	4.1	2.2	40.7
Area available in present public forests-----	.1	.5	.5	0	.2	2.0	4.1	2.2	9.6
Additional area required-----	1.7	1.6	4.5	5.9	14.6	2.8	0	0	31.1
Total area unfavorable, requiring simple protection-----	.7	0	5.0	8.6	17.8	8.8	10.4	18.4	69.7
Area available in present public forests-----	0	0	.2	0	0	4.0	10.4	17.0	31.6
Additional area required-----	.7	0	4.8	8.6	17.8	4.8	0	1.4	38.1
Total area needed-----	19.5	22.1	51.2	66.3	194.1	53.6	25.0	27.5	459.3
Total area available in present public forests-----	1.4	2.0	4.7	.7	3.2	23.0	23.5	26.1	84.6
Additional area required-----	18.1	20.1	46.5	65.6	190.9	30.6	1.5	1.4	374.7

The task of providing continuous management for timber production on 374.7 million acres of forest land is a huge one. Private holders of stumpage and the farmer with his farm wood lot must be depended on to contribute a large share to the undertaking even if public agencies greatly expand their present efforts. How far private enterprise can go depends not only on present trends, but on the potential opportunities for industrial and farm forestry. On pages 891 to

985 of this report the opportunities for private forestry were considered and appraised for each important region.

On the basis of the assumed percentages of forest lands in each region likely to be retained by private owners as given in table 5, the 374.7 acres now in private ownership and required in the budget for timber production have been allocated in table 10 into what is likely to remain in private ownership and management and what must necessarily be taken up in public ownership.

The figures in table 10 were arrived at in the following manner: For each region the percentage shown in table 3 was applied to the areas needed under intensive and extensive forestry. Thus in the northeast region, it is expected that 85 percent will remain in private ownership. The present private lands required in the budget for intensive forestry are 4.5 million acres; therefore, 3.8 million acres is assigned for continued private ownership and 0.7 million acres must be taken up in public ownership.

TABLE 10.—*Probable division of acreage now in private ownership as between different kinds of management and private and public ownership*

[Values given in millions of acres]

Region	Under intensive forestry		Under extensive forestry		Protection only—fair land		Protection only—poor land		All management		All lands
	Pub-lic	Pri-va-te	Pub-lic	Pri-va-te	Pub-lic	Pri-va-te	Pub-lic	Pri-va-te	Pub-lic	Pri-va-te	
New England	0.7	3.8	1.7	9.5	0.8	0.9	0.6	0.1	3.8	14.3	18.1
Middle Atlantic	.8	4.2	2.0	11.5	.8	.8	0	0	3.6	16.5	20.1
Lake	4.7	4.3	51.8	12.4	2.3	2.2	4.3	.5	27.1	19.4	46.5
Central	2.6	7.0	11.4	30.1	2.9	3.0	7.8	.8	24.7	40.9	65.6
South	11.6	17.4	15.8	77.7	7.3	7.3	16.0	1.8	86.7	104.2	190.9
Pacific Coast	3.9	1.1	13.9	4.1	1.4	1.4	4.3	.5	23.5	7.1	30.6
North Rocky Mountain	.2	0	1.2	.1	0	0	0	0	1.4	.1	1.5
South Rocky Mountain	0	0	0	0	0	0	1.3	.1	1.3	.1	1.4
Total	24.5	37.8	97.8	145.4	15.5	15.6	34.3	3.8	172.1	202.6	374.7

Similarly, 11.2 million acres now in private ownership under extensive forestry are needed in the budget of which 85 percent are assumed will remain in that category. This gives 9.5 million acres remaining in private ownership, and 1.7 million acres which must be acquired by the public. The same process was followed for all the other regions. For the areas requiring merely protection, it was assumed that for the favorable lands about 50 percent will remain in private status and 50 percent in public. For the unfavorable areas, 10 percent was assigned to private and 90 percent to public ownership.

The data in table 10 as far as they allocate probable future ownership of lands must be considered only as an approximation and on the assumption that private ownership will be far more affirmatively interested in continuous timber management than it has in the past. Even in the most favorable regions, the present acreage either under intensive or crude forestry is inconsequential when the total allocated in the budget for private endeavor is considered.

Forestry by private owners under this plan would require the following distribution of the total of 202.6 million acres: 37.8 million acres in intensive forestry; 145.4 million acres in extensive forestry;

15.6 million acres under protection on lands favorable for forestry; 3.8 million acres under protection on lands unfavorable for forestry.

Table 11 indicates the regional distribution of the 172.1 million acres of present private land apparently destined for public ownership, plus the area now available in public ownership. Public acquisition of this 172.1 million acres would require the following selection of land by kind of management: 24.5 million acres suitable for intensive forestry; 97.8 million acres suitable for extensive forestry; 15.5 million acres favorable to forestry for protection; 34.3 million acres unfavorable to forestry for protection.

TABLE 11.—*Total area destined for public ownership for timber production*

[Values given in millions of acres]

Region	Area now available <sup>1</sup>	Additional area from private ownership	Total area
New England	1.4	3.8	5.2
Middle Atlantic	2.0	3.6	5.6
Lake States	4.7	27.1	31.8
Central States	.7	24.7	25.4
South	3.2	86.7	89.9
Pacific coast	23.0	23.5	46.5
North Rocky Mountain	23.5	1.4	24.9
South Rocky Mountain	26.1	1.3	27.4
Total	84.6	172.1	256.7

<sup>1</sup> Other lands now in public ownership are so located, or lack the kind and amounts of timber stands, that they cannot be considered as a factor in timber production.

In determining how far the public must go in acquiring and managing forest land the following facts must be given careful consideration:

1. The total forest growing stock in the Nation is insufficient to maintain a supply equal to present consumption of timber.

2. The regions where the most favorable opportunities for private forestry exist have depleted growing stock, and cannot produce a reasonable quota of the Nation's timber needs, unless a combination of intensive and extensive forestry is applied to a large part of the commercial timber areas.

3. The regions with a considerable surplus in growing stock are those only moderately favorable for private forestry.

Obviously, if this seriously depleted growing stock is not built up, a progressive reduction in timber supply must be expected. This question has, of course, an important bearing on the amount of forest and abandoned agricultural land that should be placed in public ownership. The public has too much at stake to leave the result to accidental fruition, or to the possibility that a shortage of stumps and high lumber prices will attract private enterprise to keep pace with national timber needs. The safer and sounder policy, and as a first step, is to place at least the 172.1 million acres in public ownership, and under proper management with the assumption that private owners will handle 202.6 million acres. Even on lands where private forestry can be practiced profitably, but where no private interest for doing it exists, it will be good national economy to extend public forests immediately.

The evidence indicates strongly that public forestry on an enormously increased scale is needed in the Southern, Central, and Lake

States regions, where growing stocks are most seriously depleted. These regions are counted on to contribute ultimately a great share of our timber requirements.

But even in the Pacific region, showing an abundant surplus of growing stock, failure to treat forests properly, applying at least extensive forestry methods, will bring large parts of this region, as the virgin stands are cut, into the same critical forest conditions existing in the older regions of the East. This justifies extension of public forests in the West, particularly to protect the present surplus of growing stock, and secondly, because private enterprise on the whole is largely disinterested in a long-term timber management business.

Public ownership of watershed and recreational areas is an established procedure for many States and the Federal Government. Public acquisition of forest lands chiefly for timber production has likewise been established as a Federal venture. Heretofore Federal acquisition has been planned to create relatively small and well-managed units to serve as demonstration areas, rather than to handle large areas of forest land chiefly valuable for timber production. The situation now calls for strong emphasis on large-scale timber production, particularly as the wastage of forest values has been accelerated during the process of private ownership breakdown. Through public ownership existing values can be safeguarded and built up. The ultimate public cost will in the long run be far less if action for public acquisition is initiated at once and on a large scale commensurate with the task ahead.

#### FEDERAL ACQUISITION OF PRIVATE STUMPPAGE AS A MEANS OF PROLONGING EXISTING TIMBER SUPPLIES

A section of this report ("Public Acquisition of Private Lands as an Aid to Private Forestry") shows in detail the justification for Federal acquisition of stumppage as a means of stabilizing the timber industries and local communities.

In the States of the north Rocky Mountain and Pacific regions it was shown that an excessive volume of merchantable stumppage is in private hands, that the accumulated carrying costs on it have forced many properties to go on an operating basis in order to obtain current income, that the installed mill capacity and the annual output of lumber both exceed normal consumptive demands. The excess production forces drastic cutthroat competition, both within the two regions and with other lumber-producing regions, and compels high grading of the best species, trees and logs. Thus large quantities of intrinsically useful material are necessarily left unused and the total drain on the timber supplies is chronically far in excess of the material needed and used.

The statement referred to indicated that there still remain in the northern Rockies and Pacific regions a number of nonoperating timber properties, but that the owners are under very heavy financial pressure to liquidate. Additional operations would obviously make an already critical overproduction situation worse, both in terms of industrial and local economic distress, and in wastage of intrinsically useful timber supplies.

The analysis of available supplies of stumppage and the rate at which new growth is taking place shows clearly the urgent need to husband the stocks of already grown timber that we now have. About 636

billion board feet out of the total saw-timber stand of 1,668 billion is in private ownership in the northern Rockies and Pacific regions. Of this, about 242 billion board feet (excluding farm woodlots except in California and inferior species such as larch and fir) are in accessibility zones 2 and 3, that is, so located that no profit can be made in operating the stumps, on the basis of average operating costs and selling prices. Despite this fact, new operations continue to be begun in these zones, because of the unendurable financial pressure which forces stumpsage owners to risk any gamble in order to obtain some current income.

An analysis of other possible means of controlling the installation of new operations ended with the conclusion that the surest way to curb further overproduction was for the Federal Government to acquire substantial volumes of saw timber on nonoperating properties. Such a program would enable the Federal Government as stumpsage owner to offer for cutting the acquired stumps along with existing national-forest stumps as it was actually needed. This plan of management would be simply a continuation of established policies. If new and large operations could be prevented for even a few years, as this program would prevent them, old operations would continue to drop out, as stumpsage supplies were used up, and a reasonable balance between production and consumption demands would become established.

In this way, too, new operations could be organized on a sustained-yield basis, that is, cutting only the amount each year that could be replaced through regrowth. Plan-wise utilization such as this is an established part of national-forest operations, and avoids the worst consequences of the over-rapid liquidation now characteristic of lumber operations on private lands.

Even a moderate slowing down of the rate of removal of the private stumps of the Northwest would prolong markedly the period during which it will be available. Moreover, the more stable industrial conditions which could be brought about through balancing production and consumption would make it profitable to utilize large quantities of wood which is not used when cut-throat competition prevails.

The more orderly utilization would have the further desirable effect of maintaining growing stocks. Stumps in the East have been liquidated under private ownership to a point where the growing stock is only about 40 percent adequate. Too rapid rate of cutting and lack of attention to keeping the cut-over land productive have resulted in the job now on hand.

Exactly the same process is now going on in the West on private forest lands. The increased Federal ownership would surely prevent an unnecessary reduction in growing stock, but one which is inevitable unless present western trends are halted.

The need for maintaining growing stock, for husbanding available supplies, and for augmenting them in effect by more complete utilization is so clear that whatever feasible method will accomplish these purposes is worthy of adoption.

Federal purchase of about 90 billion feet of private stumps in zones 2 and 3 would have such an effect. It is estimated that the purchase price would be about \$100,000,000. By withholding the stumps from sale until actually needed, this sum plus carrying charges would certainly be returned to the Federal Treasury. In the long run the project would at least pay for itself.

The public acquisition program recommended as necessary to carry the public's share of balancing the timber budget therefore includes

saw-timber areas, as well as areas on which timber below merchantable size is now growing and areas which must be restocked. A balanced public program necessitates prolonging to the utmost the supplies now available, besides growing future supplies. Both projects are covered in this program.

## PUBLIC OWNERSHIP AND WATERSHED PROTECTION

### EXTENT AND DISTRIBUTION OF WATERSHED AREAS

The protective value of forests to watersheds is summarized for the major regions in table 12. Of the total of 244 million acres of commercial and noncommercial forest land east of the Great Plains exerting a major or moderate influence on watersheds something over two thirds or 171 million acres has a major watershed value and nearly 10 million acres is in public ownership. West of the Plains 137 million out of 205 million acres possess major watershed value, and nearly 120 million acres are publicly owned.

### PRESENT OWNERSHIP

The forest land with major or moderate watershed value under public ownership is 69.4 percent of all such land in the West and but 4.5 percent east of the Plains. The total of 296.8 million acres of privately owned forest land possessing watershed value are a potential field for eventual public acquisition, to the extent that private ownership does not now promise to protect the watershed values, or as future needs develop. This statement does not, of course, mean that any such plan is recommended as a program. It means simply that where private ownership fails to conserve public values, the public may have to acquire the lands to protect itself. Thus, obviously, the estimation of the immediate or eventual area which the public should acquire can only be based on an appraisal of the existing condition of watershed lands, existing methods of treatment by private owners, and probable trends in use and treatment.

TABLE 12.—*Present ownership of commercial and noncommercial forest land having major and moderate watershed protection value*

[Values given in millions of acres]

Region	Total forest area commercial and non-commercial with major watershed value	With major and moderate value	Total area with major and moderate watershed value now publicly owned and managed	Public domain	Private forest area commercial and non-commercial with major and moderate watershed value
New England	10.9	21.3	0.9		20.4
Middle Atlantic	17.2	25.1	4.5		20.6
Lake	3.9	6.1	.3		5.8
Central	39.5	52.0	1.0		51.0
South	99.8	139.7	3.4		136.3
Total East	171.3	244.2	10.1		234.1
Pacific Coast	56.2	75.3	36.5	2.0	36.8
North Rocky Mountain	17.7	40.6	31.6	1.2	7.8
South Rocky Mountain	62.8	88.7	52.0	18.6	18.1
Total West	136.7	204.6	120.1	21.8	62.7
Grand total	308.0	448.8	130.2	<sup>1</sup> 21.8	296.8

<sup>1</sup> Exclusive of 0.9 that is not segregated from other public lands in the eastern regions.

In addition to the forest land, fully 50 million acres of the abandoned farm land previously referred to is estimated to lie within the watershed influence zones. The detailed reports on watersheds designate many regions where a principal watershed protection problem centers in revegetation and conservative management of abandoned farm lands. This acreage, therefore, is to a high degree a potential field for public acquisition, since such land is seldom attractive to private owners.

#### DEGREE TO WHICH PRIVATE OWNERSHIP IS CONSERVING WATERSHED VALUES

The studies of the Nation's watersheds recommend on the basis of present conditions, the acquisition by the public east of the Plains of 92.4 million acres of private commercial and noncommercial forest land. These figures approximate the desirable program to meet urgent public needs as they are appraised today. The suggested acreage includes only major-influence land that is not being managed, or that according to all indications will not be managed, in a manner reasonably satisfactory from the point of view of watershed protection. In the Northeast, where watershed values are in general substantially protected on lands in private ownership, only the most critical areas are recommended for acquisition; in the South, where little progress has been made on private lands even in fire protection, a much larger proportion of the major-influence land is included. Only 133,400,000 acres of forest land (commercial and noncommercial) out of a total of 202 million acres of private land having major watershed value is suggested as the public acquisition program. None of the 95 million acres having moderate influence or of the 148 million acres having slight to no influence has been recommended for acquisition for watershed protection. Of the 444,357,000 acres of privately owned forest land only 30 percent has been included in the suggested acquisition program. According to repeated indications in the watershed reports, unless existing practices are checked or modified, this estimate may need to be greatly enlarged in the not distant future.

The details of the suggested public acquisition programs by States and regions are summarized in table 13. The total of 114,200,000 acres for the watersheds east of the Plains, large as it is, includes only lands of major influence on which public interest clearly will not be met by private ownership. The watershed reports indicate repeatedly that existing practices, unless checked or modified, may add largely to this total in the not distant future.

These figures are necessarily approximations, and would undoubtedly be modified by more detailed field examinations. But they serve to focus attention on the very large area on which public acquisition and management of forest units is needed at once. Quite evidently, the cumulative effect of many decades of unplanned land use has created a very large immediate problem, and one in which public acquisition must be prepared to undertake programs far more extensive than those previously considered.

TABLE 13.—*Areas of privately owned forest and abandoned agricultural land of major influence on watersheds suggested for public acquisition in the 5 eastern regions*

[Values given in millions of acres]

Region	Commercial forest	Noncommercial forest	Agricultural land	Total
New England	3.6	0.2	0.4	4.2
Middle Atlantic	4.8	.4	1.0	6.2
South	42.0	10.2	11.7	63.9
Central	26.1	3.0	8.2	37.3
Lake	2.0	.1	.5	2.6
Total	78.5	13.9	21.8	114.2

The study of watersheds in its broad conclusion, therefore, still depends on private ownership to safeguard watershed values on more than half of the eastern watershed areas. This situation may look differently at some relatively near time in the future, when treatment of private lands may have changed significantly, or when the cumulative effect of bad agricultural practices may have become fully operative. Such a situation appears to exist in southern Illinois where several million acres of formerly farmed land is in process of going out of agricultural use and is eroding.

As already brought out, continuing or permanent private ownership of forest lands depends on the opportunity for making a profit from forestry, and this varies greatly from region to region. A large part of the most critical watershed areas are on the headwaters of streams, where the conditions for successful private ownership are often less favorable than the average for the general region. Dependence on private ownership to conserve watershed values on important areas to the degree indicated will certainly not be justified unless a timber-production program of the magnitude outlined in this section is made effective.

It should again be emphasized that these are only approximate areas of major watershed importance, on which private ownership has most markedly failed to conserve the public values, and where, therefore, public ownership appears as the most effective solution. Detailed field examinations are needed as a basis of definite plans for public acquisition. Other considerations than condition of land necessarily have a bearing on the feasibility of public ownership as a remedy for depreciating watersheds.

#### LIMITING FACTORS IN ESTABLISHING PUBLIC PROTECTION FORESTS

Public watershed protection forests, in order to accomplish their primary purpose, necessarily must bring into public ownership a reasonable proportion of the total hill land within their boundaries. On a mountain slope, for example, if 10 percent were acquired and well managed while the remaining 90 percent remained in bad condition, or was subjected to destructive practices, the effect of the public ownership on the watershed as a whole would be relatively slight. Quite probably the public effort would not be justified, since the same expenditures made in an area where a higher percentage of land could be acquired and managed, would pay larger dividends in watershed protection.

Public agencies engaged in acquiring forest units for watershed protection need to know in advance about what proportion of the total area needing protection can be acquired at reasonable unit costs. The acquisition of land for forest is limited in the main to woodlands, either those on farms or in other ownership, and to farm land which has been abandoned for farming purposes, or is used merely as wild or uncultivated pasture. With few exceptions, hill farms in active use for crop land or cultivated pasture, are unavailable for public purchase, simply because unit prices are generally very materially higher than for other classes of land.

The reports on major watersheds recite numerous areas in which erosion brought on by cultivation of slopes is not only ruining the soils for agricultural cropping, but is contributing in a serious degree to irregular run-off and silting of rivers. The problem of sloping lands actively used for agriculture is not, however, to any significant degree one susceptible of immediate solution through forestry. As hill lands become seriously eroded through the practice of unwise agriculture, they tend to drop out of any but the most extensive agricultural use, and come within the price range of public agencies. The basic principle in public acquisition for watershed protection necessarily has to be, in general, to acquire the greatest number of acres having high watershed value, rather than to acquire particular areas.

In analyzing particular watershed areas as possible purchase units, any public agency must, therefore, reckon the lands potentially obtainable as including only the three classes mentioned. No definite and fixed percentage of ownership within a unit can well be set as marking the minimum public holding which would accomplish watershed protection to the degree justifying a long-continued public project. The higher the probable percentage of acquisition, the better. A few of the western national forests contain only about 40 percent of public land, and yet are effective in accomplishing the public purposes for which they were established. Administration of such forest units, though complicated by the alienations, is feasible. Units of smaller size, such as parts of ranger districts, commonly have 25 percent only of public land.

It seems reasonable to use 35 percent of potentially obtainable land as the limit below which public acquisition of lands for watershed protection would rarely go. This guide is simply an approximation, useful in analyzing the opportunities for public forestry in some of the major drainages of the eastern and central forest regions.

Experience to date with public forests shows that the beneficial effects are not confined to the lands actually in public ownership. The systematic fire control on public forests is necessarily extended to intermingled private lands, so that in this respect the entire area within a public forest is usually treated as a unit. Where grazing of domestic livestock is a use of the public lands, cooperative arrangements are gradually worked out so that conservative grazing on private as well as public lands is brought about.

A further factor limiting the initiation of public acquisition programs is that units need to be of fair size before economical and effective administration is possible. A lone unit containing say 50,000 acres would require a resident forest officer to protect it against trespass and fire, and handle current business. If a part-time employee was used, the effectiveness of public ownership might readily be lessened. No

inflexible guide can be set up, but in most cases units containing less than 100,000 acres of potentially obtainable land should be of noteworthy importance and value to justify consideration as public purchase units for watershed protection. However, in cases where intensive management for forest production, or outstanding demonstration value or recreational value will be combined with watershed protection value, the minimum size of units can often be materially lower than 100,000 acres.

In several of the Central States, relatively narrow bands of badly eroding land along the main rivers offer a problem not previously met in public forest acquisition in this country. The area of land in each unit would be relatively small, and new problems of administration would develop. Nevertheless, the urgency of stabilizing these "breaks" is so high that some form of public acquisition and management is clearly needed.

#### THE OBJECTIVE OF PUBLIC FOREST ACQUISITION

The principle that within public purchase units, not less than 35 percent of the total watershed value land should eventually be acquired, applies with the greatest force to the plans of public agencies for the individual major watersheds. If a given river has on its watershed say 30 million acres of land which is depreciating under private ownership, the highest possible type of public management on one or two or three million acres can hardly stabilize the watershed as a whole. In considering a given unit, the public is not justified in going in at all unless it can expect to acquire a major holding. If the field for eventual public ownership is sharply limited, public entrance is probably unwarranted.

The same consideration applies in the consideration of watersheds of individual streams. Either public ownership should contemplate an eventual large share in the total area needing protection, or it should keep out. The objective of watershed protection is to stabilize the stream as a whole, and is not primarily to stabilize particular areas of land.

The early concept was that a few public forests on the headwaters of major streams would do the job of watershed stabilization. Experience on the western watersheds shows unmistakably that all of the land on a watershed must be given proper treatment, or the beneficial effects obtained on 50 or 60 percent of the land will be seriously depreciated. The lower areas are, in several cases, partly nullifying the effectiveness of national forests on headwaters. The exceedingly critical erosion on the "breaks" of the Mississippi, Ohio, and Missouri Rivers is by no stretch of the imagination a "headwaters" problem. All or a very high proportion of the land in a drainage basin as a whole must be recognized as the field for planned and conservative land management.

Clearly the greater the public values at stake, the greater the urgency for public acquisition and management. Where public funds have been or are to be invested in constructing reservoirs or in improving navigation, unrestricted silting due to erosion within the watershed, will obviously shorten the life of the public improvements, and wipe out some of the capital investment. Protection of water-

sheds having such costly public improvements automatically assumes a high priority. The reports of the major watersheds indicate the location of the high value projects.

#### EXTENT AND LOCATION OF WATERSHED AREAS FEASIBLE FOR PUBLIC OWNERSHIP

In table 14 are summarized by regions the total acreage of forest and already abandoned agricultural land which is in units such as have been suggested as feasible for public ownership. The figures were derived in the following manner:

For each county indicated by the watershed studies as having major or moderate watershed importance, the acreage of woodland on farms, woodland in other ownership, and farm land abandoned for cropping were combined to give a total figure. This is the area potentially obtainable for public forests, as explained previously. The percentage of the total area of the county which the potentially obtainable land makes up was then calculated, and each county was thus classified as having less than 20 percent potentially available land, from 20 percent to 34.9 percent, from 35 percent to 49.9 percent, from 50 percent to 64.9 percent, and over 65 percent.

The diagram maps then made it possible to determine the location of groups of countries having 35 percent or over of potentially obtainable land, and thus to block out units of not less than 100,000 acres. The process was applied to the States in the South, Central, and Lake regions where the individual watershed reports indicated particularly critical problems of watershed protection.

Not all of the potentially obtainable land can be regarded as actually available within the price range of public purchase. Some owners of forest land, for example mining companies, do not figure their property as timber land but as mineral land. So long as the minerals are being extracted the property is not on the market.

A certain amount of woodland within the units is attached to farms which will remain in cultivation. Where the farm land and woodland on an individual farm are intermingled, the owner would be little interested in selling the woods only.

In table 14, a reduction of the "potentially available" figures has been made to give recognition to the fact that certain individual owners of forest land are likely to hold their properties. The estimate of "actually available" land, which is recommended for eventual public purchase, is necessarily an approximation. The amount of land finally obtainable in a given unit can be determined only after many years. This analysis indicates that in the Central States region feasible public ownership units totalling 44.1 million acres of potentially obtainable land might be blocked out. The great bulk of this lies within the major influence zone. In the Southern States the total area is 73.3 million acres, and in the Lake States 3.1 million acres, both almost wholly within the major influence zones. Even these very large areas are not estimated to take care of all the watershed areas or existing problems in the regions mentioned. They would, however, take care of major value areas with important immediate problems.

Most of the recommended units in these regions would be entirely new, that is not tied into existing public forests. Most of the States in the Central and Southern regions have no forest acquisition program and national-forest purchase areas already established cover

only a small fraction of the total area within which public acquisition is both needed and feasible.

In the New England and Middle Atlantic regions many of the States have already established forests and parks as well as programs for additional acquisition. The analyses of opportunity for public forest units have therefore not been made for these regions.

In the West, an area of 21,800,000 acres of public domain has high or moderate watershed value, but is not managed. Placing of this area under management by adding it to existing national forests has been already recommended as feasible, and since the lands are depreciating seriously through lack of management, this would be the greatest single step in solving the watershed problems of the West.

Studies of the private forest lands of the western regions indicate that of the 62,700,000 acres having high or moderate watershed value, some 41 million acres are within or adjacent to existing national forests, or are in blocks of feasible size to justify public acquisition. Extension of national forest boundaries for the purpose of allowing acquisition of private lands has already placed a large area of such lands within the reach of existing public acquisition programs.

#### PUBLIC AREAS RECOMMENDED FOR WATERSHED PROTECTION

Table 14 indicates the recommended ultimate public acquisition for watershed protection for each of the major regions. In the South the total estimate of 64 million acres is in units in which 50 percent or more of the land is potentially obtainable, and is with few exceptions in mountain and piedmont plateau areas classified as having major watershed value. The units which might be blocked out are generally large and none are less than 200,000 acres.

In the Central States, most of the estimated total of 37.3 million acres is in units in which more than 50 percent of the land is potentially obtainable, though a few units in Illinois, Indiana, Ohio, and Kentucky have 35 to 50 percent only. Local studies, particularly in Illinois, indicate that the amount of agricultural abandonment as reported in the last census are very much lower than they will be within a few years. The units now estimated to contain 35 to 50 percent of obtainable land will probably have a much higher percentage of such land within a short time. The area recommended for public acquisition includes units to take care of the "breaks" along the main rivers.

In the Lake States the area in Wisconsin classified as having major watershed value and within which an area of 2.6 million acres is recommended for public forest acquisition, mostly in units containing 35 to 50 percent of obtainable land. In the New England and Middle Atlantic regions the recommended additional public forest areas of 4.2 million acres and 6.1 million acres, respectively, take account of programs already under way. In the western region, the recommended program will bring into public ownership about two thirds of the private forest land with important watershed protection value.

TABLE 14.—*Private forest land areas recommended for eventual public ownership for watershed protection*

Region	Private forest land in units feasible for public purchase	Area abandoned agricultural land in units	Total private land potentially available in units	Total private estimated as actually available and recommended for public ownership	Commercial forest in recommended units
New England		0.4		4.2	3.6
Middle Atlantic		1.0		6.1	4.7
Lake	2.6	.5	3.1	2.6	2.0
Central	35.9	8.2	44.1	37.3	26.6
South	61.6	11.7	73.3	64.0	41.6
Total, East	100.1	21.8	120.5	114.2	78.5
Pacific Coast				22.6	17.5
North Rocky Mountain				6.2	5.2
South Rocky Mountain				12.2	3.8
Total, West				41.0	26.5
Grand total	100.1	21.8	120.5	155.2	105.0

These regional recommendations totalling 114.2 million acres east of the plains and 41 million in the West are necessarily approximations. Only a very large additional amount of detailed field work could make it possible to assert that the figures are accurate. As has been said previously, existing situations, existing needs, and existing and probable future trends in land use have had to be appraised in a very broad manner in working out the recommended program. But the approximations do not obscure the fact that the needed public forest for watershed protection of important areas in the East total many times the old concepts and the existing programs of the States and the Federal Government. The ultimate area of State forests in all of the States east of the Plains, after full effect has been given to present policies, will be not much over 5½ million acres of major watershed forests and fully four fifths of this will be in the Middle Atlantic region, chiefly in New York and Pennsylvania. The national-forest programs as approved up to June 30, 1932, by the National Forest Reservation Commission contemplates the purchase of 5,171,000 acres, which will bring the total national-forest area in the East, managed primarily for watershed protection, up to approximately 10 million acres. This area, equivalent to 5.6 percent of the major-value area of the East, will have required about 45 years to acquire if the rate of acquisition to date continues.

Including lands already acquired, the existing State and Federal programs combined will finally total only slightly over 22.5 million acres, spread over 244 million acres of major and moderate watershed-value land. Whether the recommended areas for public acquisition are too high or too low is not the primary concern. It is, rather, that we recognize the very large problem of watershed stabilization, particularly in the East, and the fact that private-ownership practices and unplanned land use have created the problem; and that we accept the fact that the public agencies must acquire areas far greater than has generally been thought necessary.

The program of public-forest acquisition, even if carried out promptly, will not in itself solve the whole of the watershed problem. Either

the practices of agriculture on hill lands will have to be modified, or agriculture will have to be given up, if the problems of erosion are to be fully solved. Forestry can not be a means of halting erosion on plowed lands.

## THE MULTIPLE-USE FOREST PROGRAM RECOMMENDED FOR PUBLIC OWNERSHIP

### PRACTICABILITY OF MULTIPLE-PURPOSE PRINCIPLE

The need for publicly-owned and managed forests has been dealt with as they apply to the protection of watersheds, the conservation of recreational areas, and the building up of continuous and permanent sources for timber crops. In arriving at final estimates of the areas which should be placed under public ownership, fulfilling these three major purposes, the possibilities of multiple services have been carefully weighed. Generally, and with regard to the major portions of the proposed public forests, it will not be necessary nor desirable to segregate and dedicate certain areas for timber cropping, other areas solely as watershed units, and still others as recreational units. A skillfully managed forest can serve all these purposes at the same time. But there will be instances where management will necessarily be devoted to one dominant use, whether it be timber cropping, watershed protection, or recreation.

In the earlier part of this discussion independent estimates were made for the additional public forest needed to meet our timber, watershed, and recreational requirements. Thus it was estimated that 133.4 million acres were required for watershed, 172.1 million acres for timber, and 21 million acres for recreation. In the light of the possibility of multiple use, it is necessary to determine how far the areas in these three categories overlap.

### REGIONAL RECOMMENDATIONS FOR MULTIPLE-USE ACQUISITIONS

Three classes of land now in private ownership have been considered as available—commercial forests, noncommercial forests, and abandoned agricultural lands that can be devoted to forestry.

In table 15 the adjustments in areas between uses has been attempted. Under the heading "Net total acquisition" the first column gives the net total commercial forests now in private ownership which should be placed under public management. This figure has been adjusted to meet the needs for all contemplated uses. Similarly the next column gives the area of noncommercial forests needed under public ownership, and the third the area of abandoned agricultural lands. All three recommendations are totaled in the last column. The adjustments and the detailed calculations made are as follows:

*New England region.*—The 3.6 million commercial forests needed for watersheds will take care of the 3.5 million acres set up for timber growth; the 0.4 million acres of agricultural land needed for watersheds will be sufficient to take care of the 0.3 million acres required for timber; the 3.6 million acres set aside for timber and watersheds will be insufficient for recreational needs, so that 2.3 million acres will have to be added; the noncommercial areas remain unchanged. Thus, the

total needed is 5.9 million acres of commercial forests, 0.2 million acres noncommercial, and 0.4 million acres abandoned agricultural lands.

TABLE 15.—*Ultimate public acquisition program for all forms of land use*

[Values in millions of acres]

Region	Timber acqui- sition			Watershed acquisition				Re- creation	Net total acquisition			
	Com- mer- cial	Agri- cul- tural	Total	Com- mer- cial	Non- com- mer- cial	Agri- cul- tural	Total		Com- mer- cial	Non- com- mer- cial	Agri- cul- tural	Grand total
New England	3.5	0.3	3.8	3.6	0.2	0.4	4.2	5.9	5.9	0.2	0.4	6.5
Middle Atlantic	1.1	2.5	3.6	4.7	.4	1.0	6.1	5.9	5.9	.4	1.0	7.3
Lake	21.6	5.5	27.1	2.0	.1	.5	2.6	1.4	21.6	.1	5.5	27.2
Central	19.7	5.0	24.7	26.6	2.5	8.2	37.3	2.4	26.6	2.5	8.2	37.3
South	70.0	16.7	86.7	41.6	10.7	11.7	64.0	2.5	70.0	10.7	16.7	97.4
Pacific Coast	23.5	0	23.5	17.5	5.1	—	22.6	1.8	23.5	5.1	—	28.6
North Rocky Mountain	1.4	0	1.4	5.2	1.0	—	6.2	.7	5.2	1.0	—	6.2
South Rocky Mountain	1.3	0	1.3	3.8	8.4	—	12.2	.4	3.8	8.4	—	12.2
Total	142.1	30.1	172.1	105.0	28.4	21.8	155.2	21.0	162.5	28.4	31.8	222.7

*Middle Atlantic region.*—The 4.7 million acres of commercial forest needed for watersheds in his region is more than sufficient to take care of the 1.1 million acres needed for timber requirements, but insufficient to cover the amount set up for recreation by 1.2 million acres. The 1.0 million acres of agricultural lands needed for watershed plus the 4.7 million acres of commercial forest lands will entirely meet the needs for timber growth set up for the region. Thus, 5.9 million acres of commercial forest, the 0.4 million acres of noncommercial forest, and 1.0 million acres of agricultural lands, will be sufficient for timber, watersheds, and recreation.

*Lake region.*—In the more detailed study of ownership made in the watershed section, it was shown that in the forested region the ratio of commercial forest land to abandoned agricultural land in the Lake States is in the ratio of 4 to 1, that is, the abandoned agricultural land makes up 20 percent of the total area in large blocks of land. Therefore, it is assumed that 5.5 million acres of agricultural land is available for timber growth. The areas in the commercial and agricultural categories, therefore, overlap comfortably the areas shown as needed in the same categories under watersheds and recreation. The total, therefore, needed for the region is 21.6 million acres of commercial, 0.5 million acres noncommercial, and 5.5 million acres of abandoned agricultural land.

*Central region.*—In this region the areas required for watersheds are sufficient to meet the needs of both timber growth and recreation and hence these values appear as the total of the region.

*South region.*—In the South the intermingled agricultural abandoned land available for forestry is approximately 20 percent of the forested land. Thus, the area set up as needed for timber, being greater in both commercial and agricultural areas, can in these classes be made coincident with the watershed and recreational areas, excepting for the 10.7 million acres in the noncommercial category. The total, therefore, needed in public forests are 70 commercial, 10.7 noncommercial, and 16.7 abandoned agricultural lands.

*Pacific Coast region.*—In this region the areas needed for watershed and recreation in the commercial forest class are less than the area of the same class which must be devoted for timber production. Therefore, the 23.5 million acres under timber needs can in part be placed in the watershed and recreational areas. To arrive at the estimate of total public forests, the 5.1 noncommercial under watersheds is added to the 23.5 million acres of commercial timber forests.

*North and South Rocky Mountain regions.*—In both these regions the commercial forest areas required for watersheds are sufficiently large to take care of the timber and recreational needs. No agricultural land is involved. Therefore, the total public forests is identical with the amounts set up for watershed forests.

These estimates, totaling 223 million acres, form the recommended program for eventual public forest acquisition. Large as they are, and much as they exceed existing official programs of the State and the Federal Governments, they nevertheless are conservative in the following respects:

1. The estimates for public watershed-protection forests do not include many of the forest areas of moderate influence now in private ownership.

2. The areas recommended for watershed protection are assumed to be used for timber cropping. In many cases especially light cutting will have to be used, and in some cases no cutting can be permitted because it would disturb the stability of the protection.

3. The recreational use, with few exceptions, is assumed to be filled by areas managed for watershed protection or timber production, or both. In some areas this will not be feasible, because of intensive recreational use.

4. Reliance has been placed on private ownership to carry well over half of the total job of systematic timber production. This is vastly in excess of the proportion now being produced on the private forest lands as a whole.

The public program recommended is the minimum that can meet the public share of the known needs for watershed protection, timber production, and recreational use.

#### THE PROBABLE DISTRIBUTION OF FOREST-LAND OWNERSHIP BETWEEN PUBLIC AGENCIES

As has already been brought out, State forests in the West have been created from grants of Federal land, but in State forest programs depending on purchase, the major control of State forest-land ownership is financial ability. Unquestionably there are material differences in various States in prevailing public recognition of forest problems. There is very much more active interest in some States than in others. But an analysis of existing effort in all phases of forestry (see earlier discussions of Federal aid) indicates conclusively that financial ability is the dominant factor, particularly as to what is likely to be done in the future.

There are many ways of rating wealth. Clearly the financial ability of States to go ahead on programs of State forest acquisition will involve consideration of at least the following factors and their interrelation: Total wealth, spending power, acres of private forest land, population.

Table 16 shows by regional groups of forest States the significant figures useful in considering the size of the forest problem and the financial capacity of the State. The regional ratings, which are entirely relative, are also shown.

TABLE 16.—*Relative financial capacity of State groups to manage forest lands*

Region	Wealth in relation to private forest land				Population in relation to area			
	Total wealth (1922)	Area private forest land <sup>1</sup>	Wealth per acre		Total population, 1930	Total area	Population per square mile	
			Actual	Rating			Actual	Rating
New England	24,414	19.6	1,246	2	8,166	61.9	132	1
Middle Atlantic	82,280	15.5	5,308	1	28,131	111.9	251	1
Lake	27,819	34.8	799	3	11,026	263.8	42	3
Central	67,344	31.3	2,152	1	30,577	363.0	84	2
South	47,895	129.4	370	4	28,541	760.5	38	3
Pacific Coast	23,574	27.9	845	3	8,194	318.1	26	3
North Rocky Mountain	3,777	5.9	640	4	983	229.5	4	4
South Rocky Mountain	7,907	5.1	1,550	2	3,412	706.4	5	4
Total and average	285,010	<sup>2</sup> 269.5	1,020	-----	<sup>2</sup> 119,030	<sup>2</sup> 2,815.1	-----	-----

Region	Private forest per capita		Net retail sales to United States average net <sup>3</sup>		Average of all ratings
	Area	Rating	Ratio	Rating	
New England	2.40	2	108	1	1
Middle Atlantic	.55	1	111	1	1
Lake	3.16	3	106	1	2
Central	1.02	1	90	3	2
South	4.53	4	61	4	4
Pacific Coast	3.40	3	127	1	3
North Rocky Mountain	6.00	4	100	2	4
South Rocky Mountain	1.49	2	101	2	2

<sup>1</sup> Commercial, other than farm woodlands.

<sup>2</sup> Exclusive of Kansas, Nebraska, and the District of Columbia.

<sup>3</sup> Editor and Publisher, Nov. 28, 1931.

Relative ratings of wealth per acre and private forest land per capita agree in detail, and the relationships are particularly significant. The average ratings in the last column have been used in estimating relative present ability of State groups to acquire and manage State forests.

#### DISTRIBUTION

Leaving aside the relatively inconsiderable ownership of forest lands by the smaller political subdivisions, the bulk of the future publicly owned forests will be divided between the States and the Federal Government. The proportion can be approximated by answering the questions. How much will the several States be able to own and manage? and How much, therefore, will the Federal Government have to own and manage?

Table 16 makes possible a broad classification of relative wealth of the States by forest regions. There are of course differences in rating of individual States within a forest region, and the predominant rating has been adopted for each region.

In some of the wealthiest States an active State program or forest-land acquisition is under way. In these there is every reason to believe that the bulk of the additional public acquisition will be handled by the States. But in nearly all, there are areas of watersheds on interstate streams, the ownership of which is a Federal responsibility. On the average, probably 20 percent of the total land acquired will be by the Federal Government and 80 percent by the States.

In the least wealthy group of States it is clearly not to be expected that the States themselves will be financially able to own and manage a large proportion of the acreage. But selected areas, including those having great local recreational and other public values, will presumably be acquired and managed by the States. On the average, therefore, in these groups of States probably 20 percent of the total public acquisition will be by the States.

Two intermediate grades of State financial ability are recognized in which it is estimated that 40 and 60 percent of the total public acquisition will be by the States.

On the basis of these percentages, an estimate of the division of the public acquisition job between the States and the Federal Government is given in table 17. In round numbers, the State share is 89 million acres, and that of the Federal Government 134 million acres. Clearly this is an approximation, but one based on results to date, current trends, and known differences in financial ability between different States and regions.

TABLE 17.—*Probable future distribution of additional public forests between States and Federal Government*

Region	Total public acquisition	Estimated State acquisition		Estimated Federal acquisition	
		Percent	Million acres	Percent	Million acres
<i>Million acres</i>					
New England.....	6.5	80	5.2	20	1.3
Middle Atlantic.....	7.3	80	5.8	20	1.5
Lake.....	27.2	60	16.3	40	10.9
Central.....	37.3	60	22.4	40	14.9
South.....	97.4	20	19.5	80	77.9
Eastern regions.....	(176)	-----	(69)	-----	(107)
Pacific Coast.....	28.6	40	11.4	60	17.2
North Rocky Mountain.....	6.2	20	1.2	80	5.0
South Rocky Mountain.....	12.2	60	7.3	40	4.9
Western regions.....	(47)	-----	(20)	-----	(27)
All regions.....	(223)	-----	(89)	-----	(134)

The foregoing estimates of the eventual size of State and national forests go far beyond the existing official acquisition programs. The area of State forest will be increased by 8,374,000 acres when present State policies and plans are fully worked out (table 2).

Responsible officials in many of the States have prepared estimates of the ultimate area they regard as a suitable objective for an adequate State forest policy. These estimates total 51,419,000 acres, a figure of the same order of magnitude as the estimates worked out in this report. It is clearly desirable that these tentative State plans go ahead as rapidly as possible.

The present plans for national forest additions total 10,977,000 acres in the East and 18,500,000 in the West, or 29,477,000 acres altogether.

The total job of public forest acquisition and management that lies ahead is so large on any basis of estimation, that exactness in apportioning it between the States and the Federal Government is hardly necessary. What is important is recognition that there is abundant opportunity and need for participation by both, that the function of the Federal Government is to supplement State programs, rather than supplant them, and that agreements regarding the sphere of each agency, and carrying out of noncompetitive programs, depend on acceptance of the public forest undertaking as a partnership.

## THE COST OF THE PUBLIC ACQUISITION PROGRAM

Estimates of the probable cost of the acquisition program as here recommended must also be approximations, even though a very large amount of experience has accumulated in the national-forest purchase work to date. But average prices paid heretofore for given classes of land are almost certain to be reduced in future public acquisition work, because going prices of wild land are substantially lower than formerly.

The average price to date per acre for 4,727,000 acres of land acquired in the East for national forest purposes has been \$4.49. The estimated cost per acre for 7,640,000 acres yet to be purchased in already established national-forest units in the East is \$4.05. When the trend thus indicated is taken into account in estimating future per-acre prices for different classes of land in each major region in the East, over the period of time involved in the purchase of the 176,000,000 acres of public area to be acquired, the total expenditure is reckoned at \$572,000,000, or an average of \$3.25 per acre. This is approximately two thirds the average cost of purchases made to date, and takes account of lands which are likely to come to the public through donations and tax delinquency. Needless to say, the price paid will vary widely between regions and for different classes of land within a single region.

In the West, similar estimates for the 47 million acres of public acquisition area total \$75,700,000 or \$1.60 per acre average. This estimate likewise takes account of probable donations, tax delinquency, and reduced going prices.

The 90 billion board feet of stumps recommended for Federal purchase in the West in order to prolong the existing supplies of stumps are estimated to cost \$100,000,000.

The total capital investment of the entire recommended public acquisition program, State and Federal, is thus \$748,000,000. Unless going prices change radically during the period of public acquisition, this sum should be sufficient to acquire the forest properties which have been indicated as needed in public ownership.

Of this total sum, the Federal acquisition program, as set forth in table 17 would cost \$347,800,000 in the East, and in the West \$100,000,000 for stumpage, and \$43,450,000 for land, a total of \$491,250,000.

The cost to the States, on the basis of division already outlined, is thus approximately \$250,000,000.

## A SUGGESTED IMMEDIATE FEDERAL AND STATE PROGRAM

The recommended Federal program for purchase of forest and abandoned agricultural land and stumpage may and should be spread out over a period of years.

The major urgent considerations justifying a large immediate program are:

1. Most of the areas which should eventually be acquired are depreciating seriously now. Prompt purchase and administration are needed to begin the often difficult process of rehabilitation. This is true equally of watershed and timber-production areas.

2. The stumpage to be purchased should be acquired in the near future, or much of it is likely to go on an operating basis, and the opportunity for stabilizing its utilization will be lost.

3. Enormous areas of land and stumpage are obtainable at very reasonable prices, and it is obviously in the public interest to take advantage of these without delay.

4. The prompt initiation of the purchase programs would release frozen assets and put money into circulation, and with no question of the worthwhileness of the public expenditures.

5. Once acquired by the public, the forests, particularly in the East, would give a very desirable outlet for emergency employment of labor on the large job of improvements that would be required to develop and improve the forest property.

6. Acquisition programs of the Federal Government and of many States are already on a going-concern basis, and could readily be expanded many times. A rapid expansion could be made without loss of effectiveness or of economical purchase at fair prices.

The total program should be carried out on a 20-year basis or an average of 5 percent a year, for land acquisition, and a 10-year basis for stumpage acquisition. A slower rate of progress would clearly fail to meet both the urgent needs and the opportunities that exist. A very much higher rate of speed would go beyond the present capacity to expand effectively. In round figures, this would mean an annual capital investment by the Federal Government of \$30,000,000 for both land acquisition in the East and West, and stumpage acquisition in the West. Of this an average of \$18,000 000 would be for eastern and \$12,000,000 for western purchase.

At the same rate of increase the annual cost for the State forest programs suggested would be 12.5 million dollars. Clearly this rate is exceedingly desirable. The current financial situations of many States, like that of the Federal Government, involves recognition of sharp reductions in the income obtained from taxes, and this fact is forcing a more or less comprehensive reappraisal of both State and Federal projects, of the means of financing public undertakings, and of the possibilities of reducing public expenditures in general. It seems altogether probable that in Federal financial management a clear-cut distinction may be drawn between true current expense and

capital investment. Land acquisition is clearly a capital investment; its management is largely a current expense.

As State finances are reexamined and reoriented from this standpoint, the place of land-acquisition programs may well be even more favorable than they are today.

## SUMMARY

That major shifts of forest land from private to public ownership are imminent is shown by the fact that tax delinquency is already widespread. Farm woodlands, acquired as an incidental part of farm properties, naturally are abandoned when farming is given up, and this has occurred on more than 50 million acres. Other forest properties, acquired for their immediately exploitable timber values, must be reappraised by the owner when his income depends on long-term timber growing, rather than short-time exploitation. The public must be prepared to take over large areas of forest land as private ownership withdraws from management or ownership.

For the National Government and many of the States public ownership and management of forest lands is already established in law, in public opinion, and in fact. Public ownership has more and more supplanted the alternative methods of "laissez faire," public aid, or public regulation. In general, it appears that these other methods are less certain of desired results than is public ownership.

Public ownership of forest lands for watershed protection, timber production, recreation, and wild life is already well established, as a means to protect public values when private ownership cannot or will not do so.

The basis for division of ownership between State and Federal Government is not clear-cut. Some of the wealthy States have State forests of the same kinds of lands and for the same purposes as the national forests. Less wealthy States have done little or nothing in forest-land ownership, regardless of needs or opportunities. Financial ability of the States is the best guide to what part of the public ownership job each is likely to do, and therefore as to the remaining part which the Federal Government must do, if it is done at all.

An analysis of the opportunity for private forestry by major regions indicates that perhaps 85 percent of the forest land is likely to stay in private ownership in the most favorable regions and perhaps not over 10 percent in the least favorable. It is estimated that out of the 270 million acres of other than farm woodland, about 115 million acres (84 in the East and 31 in the West) is likely to become a public-ownership problem because of lack of private opportunity. Even the most liberal public aid in fire control has not kept unattractive lands in private ownership.

Existing formal plans of the States and the Federal Government contemplate eventual total public acquisition of not over 13 million acres by the former and 30 million acres by the latter. This is very much less than the area which seems unlikely to be retained and managed by private ownership.

The Nation's watersheds contain 449 million acres of forest land of high and medium value in the control of run-off and erosion. The watershed studies show widespread, and in many regions critical, depreciation of the watershed lands. A great deal of abandoned agricultural land as well as forest land enters into the problem which

forestry is called upon to solve. The conclusion is reached that to a very high degree private ownership has failed to conserve watershed values and that public ownership will be needed to do so.

Public ownership for watershed protection cannot be very effective unless at least 35 percent of the total area within a given unit is within the price range for public purchase. Detailed analyses indicate a total area of 155 million acres of high and medium value watershed area, in feasible units, which is recommended for public purchase and management. This very large program would still leave to private ownership a major part of the forest land possessing watershed value. In the West a large part of the whole problem can be solved by adding to the national forests an area of about 22 million acres of federally owned public domain, which is not now administered to conserve its watershed values.

The needs of the Nation for management of forest lands for timber production total 509 million acres. After taking full account of the part existing public forests may take in balancing the timber budget, and after depending on private ownership to the full extent justified by the analysis of private opportunity, the conclusion is reached that public ownership of 172 million additional acres of timber-producing land is needed. A regional program of public acquisition to that amount is recommended. The part that reforestation of abandoned agricultural lands will take in the public acquisition programs for timber production and watershed protection is estimated.

Existing tracts of saw timber are seriously deficient and should be husbanded. But in the West, where a very large part of the total stock is in private ownership, too rapid exploitation is under way, because of the financial pressure on owners of nonoperating stumpage, which forces them to go on an operating basis. Federal acquisition of not less than 90 billion board feet of such stumpage is recommended as the surest way to prolong the life of existing supplies, through bringing about a reasonable balance between production and consumption. Such a program is a vital part of the whole program for balancing the timber budget.

A regional summary of the public acquisition needed for all forms of land use indicates the total eventual program as 223 million acres—of which 176 million are in the East and 47 million in the West. The probable division of responsibility between the States and the Federal Government is estimated on the basis that the most wealthy States will be able and willing to take care of 80 percent of the full program and the least wealthy only 20 percent. The remaining areas will necessarily fall to the Federal Government if the job is to be done at all.

About 40 percent, or 89 million acres, of the total acreage is estimated as the State share and about 60 per cent, or 134 million acres, as the Federal share.

The cost of the total public acquisition program, including saw timber, is estimated at \$750,000,000. Of this, 500 million is to carry out the Federal Government's share and 250 million the States' share.

The immediate program recommended for the Federal Government is \$30,000,000 a year, estimated to take care of 5 percent a year of the total acquisition program or 6.7 million acres of land annually over a 20-year period. This would also purchase annually about 9 billion feet of stumpage over a 10-year period. This rate of acquisition is both needed and feasible. A corresponding rate for the estimated State share would require \$12,500,000 a year.